

22/16

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AUG 7 1919

Rock Products

\$2.00 A YEAR

CHICAGO

AUGUST 2, 1919





For 5 years the elements tried to destroy it—but today it is as good as new

A Keystone Kiln has stood—with top uncovered—since 1914 at a deserted quarry of the Montgomery Lime Company in Houchins, Va.

Today it is being moved sixty miles to a new location by the Kimbalton Lime Co. It is as good as new!

So satisfactory was its performance during the nine years of actual use that the Kimbalton Lime Co. has ordered a sister kiln to meet increased-production plans.

Keystone Kilns

Here you have proof of singular durability and working merit. And note that the Keystone can be moved. This can be done with no other kiln.

236 Kilns in Use to Date

Steady-Schmidt Manufacturing Co.
York, Penna.

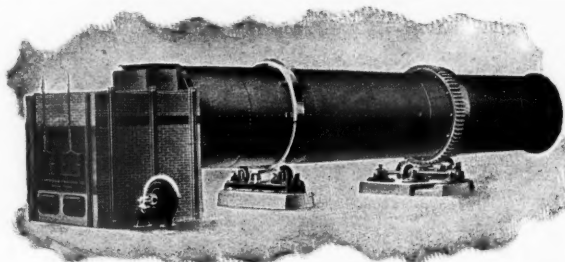
"PENNSYLVANIA" Hammer Crushers



PATENTED

For Crushing and Pulverizing Lime, Limestone, Gypsum, Marl, Shale, Etc. Main Frame of Steel, "Ball and Socket" Self Aligning Bearings; forged Steel Shaft; Steel Wear Liners; Cage adjustable by hand wheel while Crusher is running. No other hammer Crusher has such a big Safety Factor.

Pennsylvania Crusher Company
New York PHILADELPHIA Pittsburgh



DRYERS

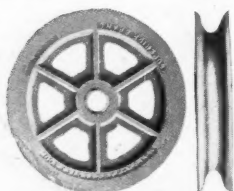
AMERICAN PROCESS CO. 68 Williams Street
NEW YORK CITY

ATTENTION

Cement Manufacturers
and Supply Dealers

Some of our customers who are using our Puncture and Waterproof bags report one-third increased sales to their satisfied customers. Also report breakage for 1917 and 1918 from all causes only one-half of one per cent.

THE JAITE CO.
JAITE, OHIO
Sole Manufacturers

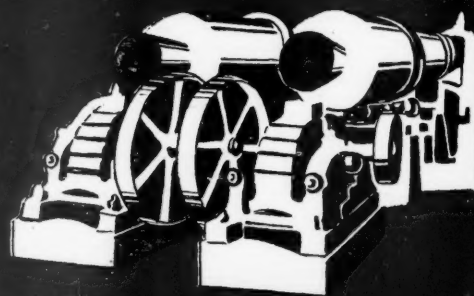


STOP
THE INTERRUPTION
→ INCREASE ←
THE PRODUCTION
of Your Plant By Installing

SUPERIOR NON-ROP-WER SHEAVES

They reduce rope wear to a minimum. Save power and insure safety. Increases Hoisting Efficiency. They cost no more than ordinary sheaves. Write for booklet today.

Mayer-Hasseldiek Mfg. Co.
Main, Wash and Commercial Sts. St. Louis, Mo.



1000 in Use—24% On Repeat Orders

That's a good enough record to win over any other dryer. It's the only dryer that gives you both the widest spread of and the best results.

RUGGLES-COLES DRYERS

They're built to last. We will place a dryer in your plant and guarantee it for one year. If it doesn't give you the best results, we'll take it back. We'll also guarantee your dryer for one year. We'll also guarantee your dryer for one year. We'll also guarantee your dryer for one year.

RUGGLES-COLES ENGINEERING CO.
50 Church St., New York, N.Y. 332 S. Michigan Ave., Chicago, Ill.

ROCK PRODUCTS is published every other week by Tradepress Publishing Corporation, 542 So. Dearborn St., Chicago. Subscription: \$2.00 a year in the United States, \$3.00 in Canada. Entered as second class matter July 2, 1907, at the postoffice in Chicago, under Act of March 3, 1879.

VOL. XXII—No. 16

Aug. 2, 1919



Rock Products seeks and reports everything of interest to producers of crushed stone, sand, gravel, lime, cement, gypsum products, agricultural limestone, phosphate, potash and glass sand. It spends many times more money than any other journal of the industry to compile its message every two weeks. Appreciate Rock Products.

Rock Products

**26 Big Issues
for \$2**

Stands without a peer in the industry. It serves the plant owners without stint or bias. Its reading pages are loaded with pictures and news.

Its advertisements are on advertising pages—where in fairness to all—they belong.

Read Rock Products—not because it serves you unselfishly but because it is the best paper. Subscribe!

Fill Out and Mail the Coupon—Now!

ROCK PRODUCTS, 542 So. Dearborn St., Chicago

Here is my \$2.00 for a full year's subscription to ROCK PRODUCTS.

Name.....

Address.....

Saying, "I saw it in ROCK PRODUCTS," will bring quick action

The Telsmith Bolt-Shaft Breaker

Advertisement No. 1

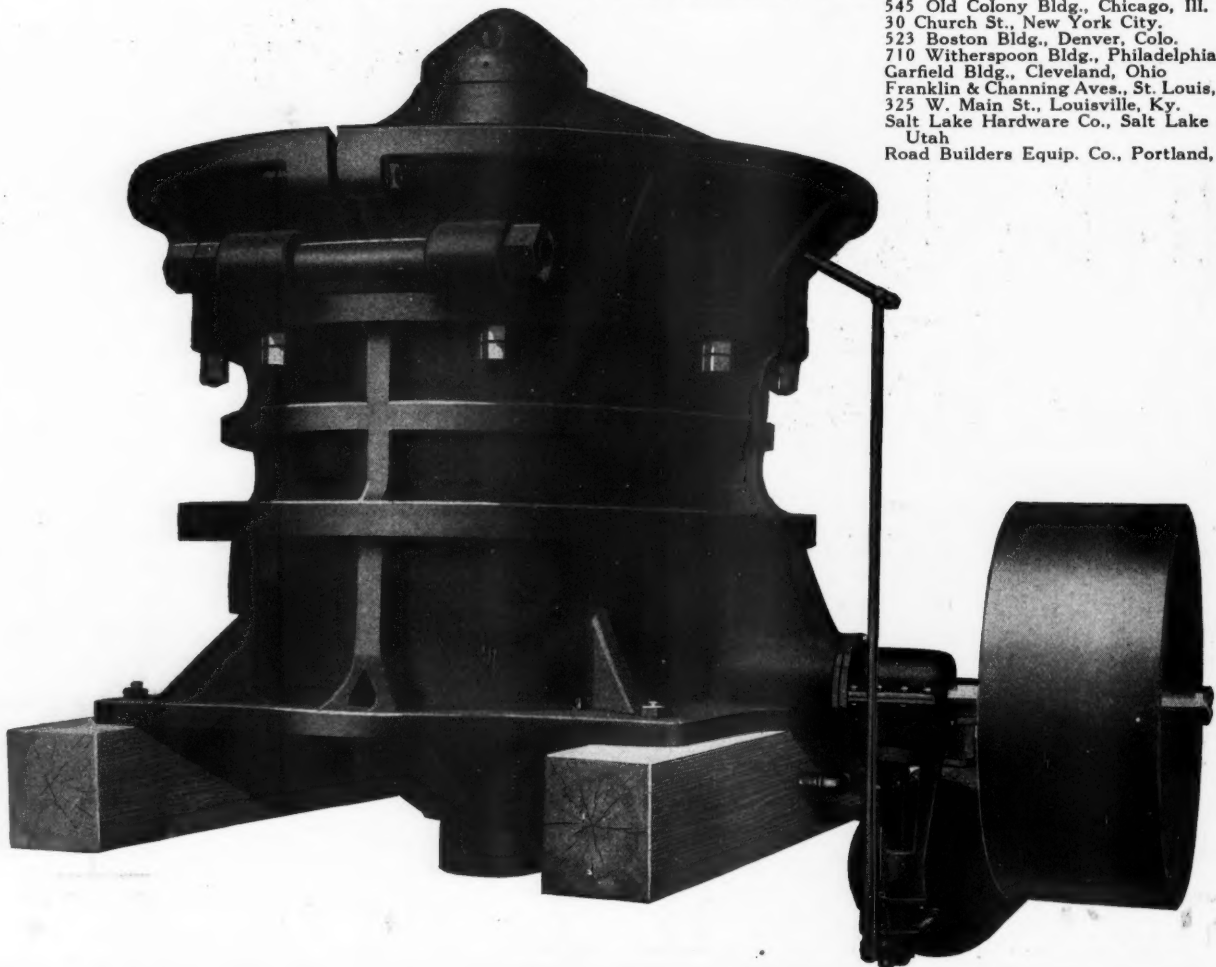
The Telsmith Breaker is frequently referred to as the "short crusher," because it is thirty per cent. lower than even the short shaft gyratories which have recently emerged into publicity. This low structure is a big advantage. For instance, it almost doubles the strength of the frame, shaft and crown. Then again, as all repairs are made from above the breaker, the conveyor or elevator can be run directly under it, making a big saving on mill height. There is also an important saving in over-head clearance, due to the reduction in height required for the removal of the short pillar-shaft.

BUT—the chief advantage of Telsmith pillar-shaft design is not its short structure, but its *parallel crushing stroke*. The head gyrates horizontally, the "pinch" being the same at top and bottom of the bowl. It will grip even hard, smooth boulders without slippage or rocketing. The effectiveness of the straight, horizontal "bite" is not merely a theory. It is proven every day in the year by Braden Copper Co. Rancagua, Chile; Penn Iron Mining Co. Vulcan, Mich.; Thomasville Lime & Stone Co. Thomasville, Pa.; Charles Warner Co. Wilmington, Del.; Webster Stone Co. Irvington, Ky.; United Railways Co. St. Louis, Mo.; Defrain Sand Co. Philadelphia, Pa.; Barnes-King Development Co. Marysville, Mont.; Kennecott Copper Co. Latouche, Alaska; Thomas Iron Co. Wharton, N. J., and in hundreds of other plants all over the world.

Glad to send you our catalog No. 166 covering the Telsmith Breakers or our Bulletin No. 2F11, covering the Telsmith Reduction Crusher. Write for them.

SMITH ENGINEERING WORKS

3188 Locust St., Milwaukee, Wis.



545 Old Colony Bldg., Chicago, Ill.
30 Church St., New York City.
523 Boston Bldg., Denver, Colo.
710 Witherspoon Bldg., Philadelphia, Pa.
Garfield Bldg., Cleveland, Ohio
Franklin & Channing Aves., St. Louis, Mo.
325 W. Main St., Louisville, Ky.
Salt Lake Hardware Co., Salt Lake City,
Utah
Road Builders Equip. Co., Portland, Ore.

Cooperation is the thing—please mention ROCK PRODUCTS

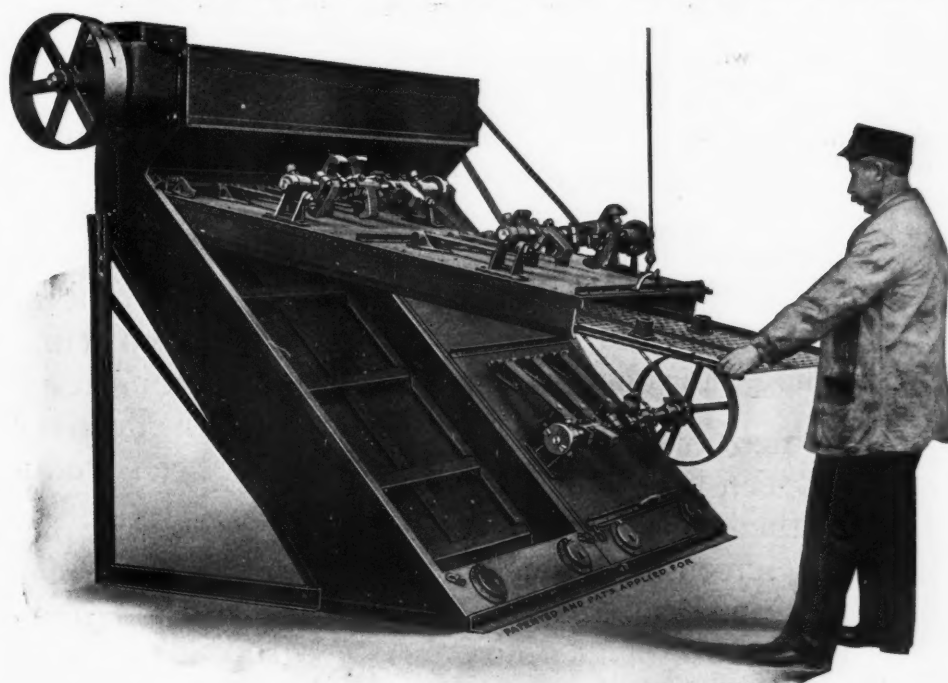


"ONE MAN - ONE MINUTE"



STURTEVANT "OPEN-DOOR" MACHINERY

"Open-Door" Sturtevant Super-Screen



The Super-Screen not only screens everything screenable with a range of 4 to 160 mesh, giving from one to four products from one machine, but is of Sectional, or Unit, "Open Door" construction with all parts interchangeable and of such small size that one man can handle them easily and quickly. Add sufficient number of Units to secure output wanted.

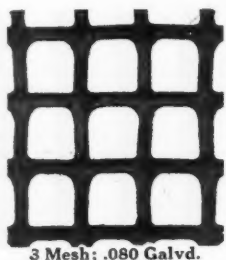
You see one man opens the door, removes the screen frames, both scalper and fine screen, and tightens the cloth—all through the open door. A one man proposition throughout—no time or labor wasted. Keep the screen in perfect condition for maximum output.

Open Door Super-Screens, like all other Sturtevant "Open Door" Machines, are built for service, to give maximum profit, to do your work cheaper than any other Screen, and they last.

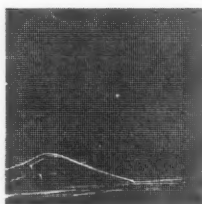
Send for Catalog of Open Door Designs of Crushing, Grinding, Screening, Elevating, Conveying, Weighing and Mixing Machinery.

STURTEVANT MILL CO., BOSTON MASS.
HARRISON SQUARE

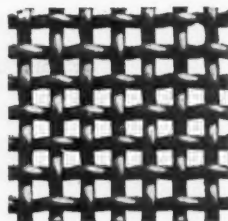
For better service say, "I saw it in ROCK PRODUCTS"



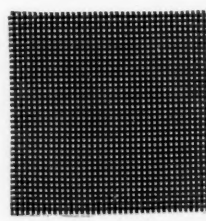
3 Mesh; .080 Galvd.



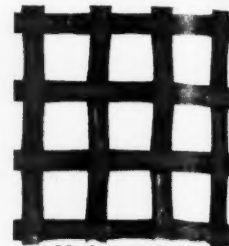
100 Mesh; .0045 Brass



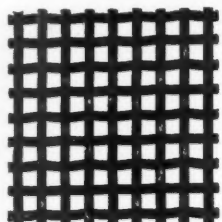
6 Mesh; .080 Wire



40 Mesh; .0135 Wire



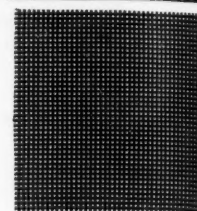
3 Mesh; .105 Rolled



8 Mesh; .054 Wire

"TYLER"

DOUBLE CRIMPED WIRE CLOTH : TON-CAP SCREEN
TESTING SIEVES : TESTING SIEVE SHAKERS
HUM-MER SEPARATORS



45 Mesh; .011 Wire

Write us about your wire cloth requirements

To get the best results from a wire cloth screening surface, it is essential that the wire cloth be maintained in a smoothly stretched, taut condition.

Until the development of the *Whip-Tap* "Drumhead" Tension Separator by this company, there was no means of maintaining a screening surface constantly in tension.

Without a taut screening surface, effective vibration is impossible, and the maximum tonnage and thorough separation cannot be obtained.

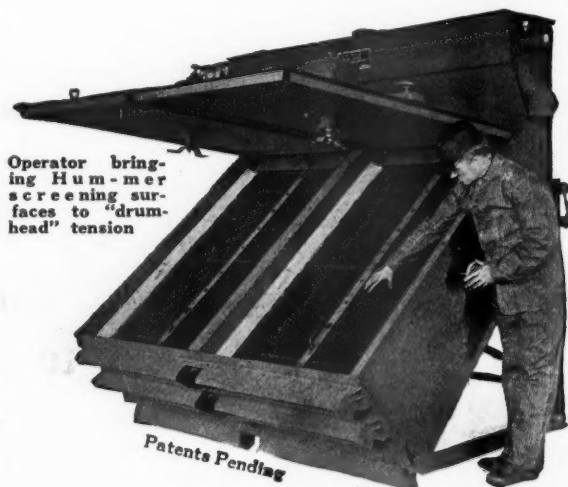
In the *Hum-mer* Separator, the same "drumhead" tension

which has made the whip-tap so successful, has been combined with electrical, high-speed vibration, and a character of sorting action is obtained that surpasses in effectiveness anything that has ever been produced.

Any desired intensity of vibration and any desired number of impulses can be imparted to the *Hum-mer* screening

surfaces, and a character of vibration can be set up that will give best possible separation on any material.

If you are screening any dry material, whether coarse or extremely fine, you are invited to investigate the *Hum-mer*.

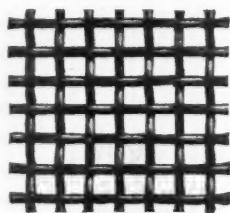


Operator bringing Hum-mer screening surfaces to "drumhead" tension

Patents Pending

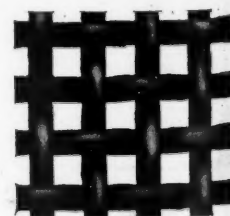
HUM-MER SEPARATOR
Drumhead Tension—Electric Vibration

Screens Agricultural Lime, Silica, Cement, Phosphate Rock, Gravel and other Rock Products



6 Mesh; .054 Wire

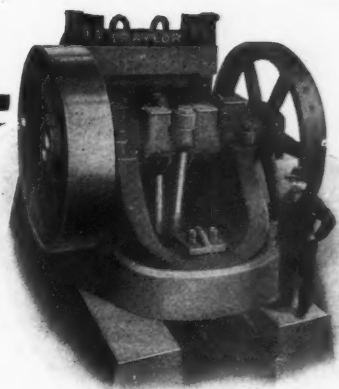
THE W. S. TYLER COMPANY
CLEVELAND, OHIO



3 1/2 Mesh; .135 Wire

The advertiser wants to know that you saw his ad in ROCK PRODUCTS

There's a Reason—



IN MAY, 1916

the General Crushed Stone Co. purchased their first Traylor Jaw Crusher, a 66" x 86"—

IN NOVEMBER, 1918

a 42" x 48" Traylor "Bulldog" Jaw Crusher—

IN JANUARY, 1919

a 48" x 60" Traylor "Bulldog" Jaw Crusher—

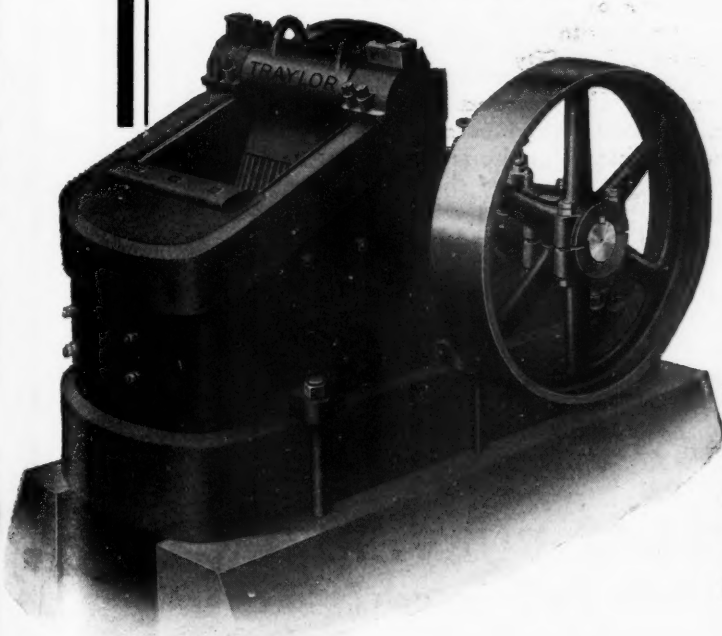
IN JULY, 1919

their fourth order comes in for another 42" x 48" "Bulldog."

BULLETIN RJX-1

will tell you why they wouldn't even consider any other make of crusher. You'll appreciate those reasons as applied to yourself.

Doesn't That
Mean Something
to You
?



Traylor Engineering & Mfg. Co.

Main Office and Works:

Allentown, Pa.

New York Chicago Los Angeles Spokane
30 Church St. 1414 Fisher Bldg. Citizens Bk. Bldg. Mohawk Bldg.

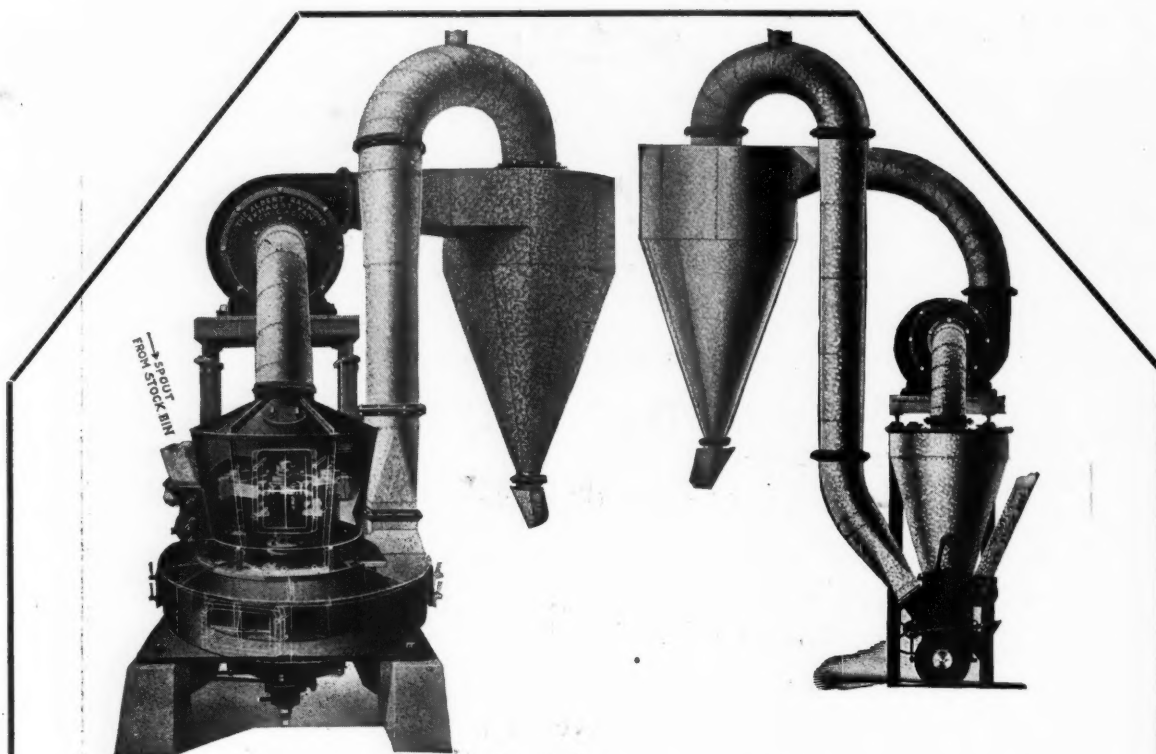
You will get entire satisfaction if you mention ROCK PRODUCTS

RAYMOND
PULVERIZING
AIR-SEPARATING
'SYSTEM'

CHICAGO-USA

RAYMOND
PULVERIZING
AIR-SEPARATING
'SYSTEM'

CHICAGO-USA



Engineering Service That Spells Dollars to You

Here is what one of our customers writes us:

"We are now operating one of your No. 0 Pulverizers which we have recently fitted with improved separator, thereby increasing our output about **fifty barrels per day.**"

This customer installed our Pulverizer seven years ago for the production of a pure hydrated lime. Since that time, due to our policy of always making every effort to improve our mills, we found that if we substituted a smaller size separator for the size we had been using we obtained a much larger capacity, besides producing a better grade of lime.

The above customer had the large separator and when they asked for prices on an additional mill to increase their capacity we furnished them with

the improved separator, instead, which cost them a great deal less and produced the results indicated above.

This incident is in direct line with many other cases where we have improved methods of grinding and saved our customers thousands of dollars.

The latest improved Raymond Roller Mills and Pulverizers will do the same for you, as they can't be equalled when it comes to the economical grinding of all dry materials to powdered form.

Send for descriptive matter today.

**EVERY RAYMOND MILL IS COVERED BY AN ABSOLUTE
GUARANTEE BASED UPON PAST PERFORMANCES**

RAYMOND BROS. IMPACT PULVERIZER CO.

Western Office:
202 Boston Bldg., Denver, Colo.

1301 North Branch St., Chicago, Ill.

Prompt attention will be given your inquiry if you mention **ROCK PRODUCTS**

Another
FEDERAL

"Shorten the miles to market—build better roads."

3½ ton Federal with
dump body operated
by hydraulic hoist.
Owned by D. Rosadi,
Providence, R. I.



Answering the Nation's Call for Better Roads

"Build now the national, state and county roads that are needed." Such is the appeal in a bulletin recently issued by the U. S. Department of Labor.

And contractors, engineers, road builders are responding with a will. Never before have so many miles of better roads been in the process of construction.

Hand in hand with this tremendous task has come a call for motor trucks of stamina, endurance, high power and low cost of upkeep.

This call is being met by Federals. All those in-built qualities which a truck engaged in road work must possess, are to be found embodied in the sturdy Federal. It is built *right* from motor to rear axle.

"Traffic News"—a monthly truck magazine—sent on request.

FEDERAL MOTOR TRUCK COMPANY
43 FEDERAL STREET DETROIT, MICH.

FEDERAL

One to Five Ton Capacities

To say you saw the ad in ROCK PRODUCTS gives tone to your inquiry

Why experiment? You can be sure

WHEN you can find out what Pierce-Arrow trucks have been doing in businesses like yours, under conditions similar to yours, with like problems to solve, it is foolish to experiment.

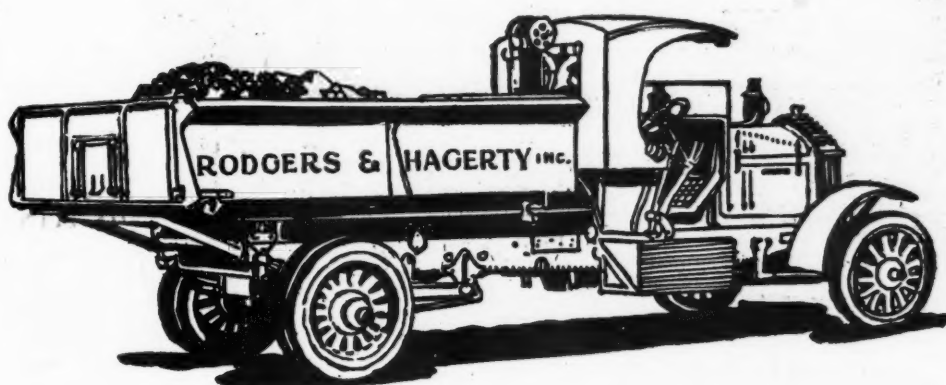
We make sure Pierce-Arrows make good by designing them to meet actual conditions, trying them out in every way and following them up day by day in the hands of owners.

We know what they have done for others, and we can tell you what they will do for you. Ask us.



It gets immediate attention if you mention ROCK PRODUCTS

RODGERS & HAGERTY, when building in South Brooklyn, the largest warehouse in the world for the United States Government, engaged fifteen hauling contractors. As many as 127 trucks worked on the job in a single day and 85 of them Pierce-Arrows. When speed and reliability were paramount, only Pierce-Arrows were employed as long as Pierce-Arrows could be obtained. Then other trucks were added.



Delivers more work in a given time;
Loses less time on the job and off the job;
Costs less to operate and less to maintain;
Lasts longer, depreciates less and commands
a higher resale price at all times.

THE PIERCE-ARROW MOTOR CAR CO.
BUFFALO, N. Y.

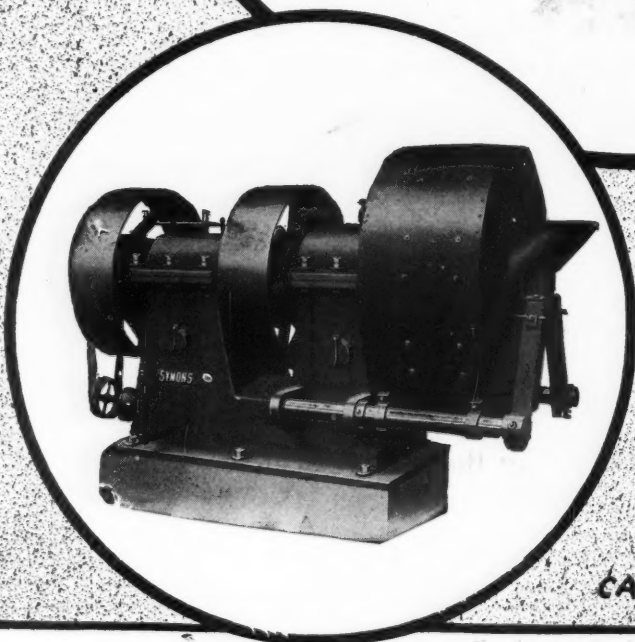
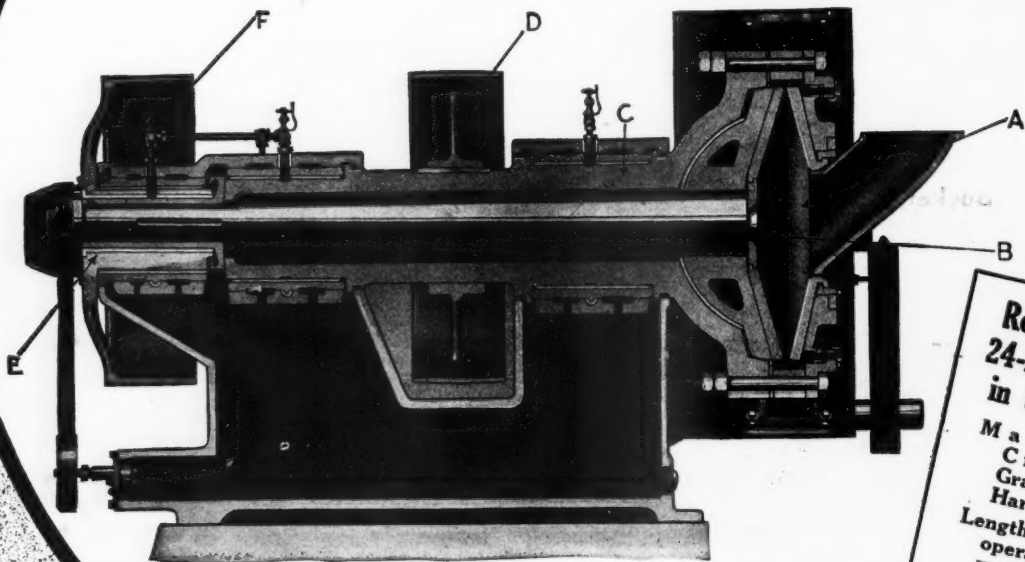
Pierce Arrow

Saying, "I saw it in ROCK PRODUCTS," will bring quick action

SYMONS

DISC CRUSHER

"The Master Crusher"



**Record of a
24-in. Crusher
in the Field**

Material
Crushed:
Gravel and
Hard Heads.

Length of time
operated, 2
years.

Size of Feed, 2
in.

Size of Product,
 $\frac{1}{2}$ in.

Horsepower
used, 20.

Tons crushed
per hour, 25.

Original crush-
ing discs still
in use.

No lost time ac-
count break-
age.

Superior to Rolls,
Jaw or Gyratory
Crushers on this
class of work

*The Whole Story—
What-How-Why*

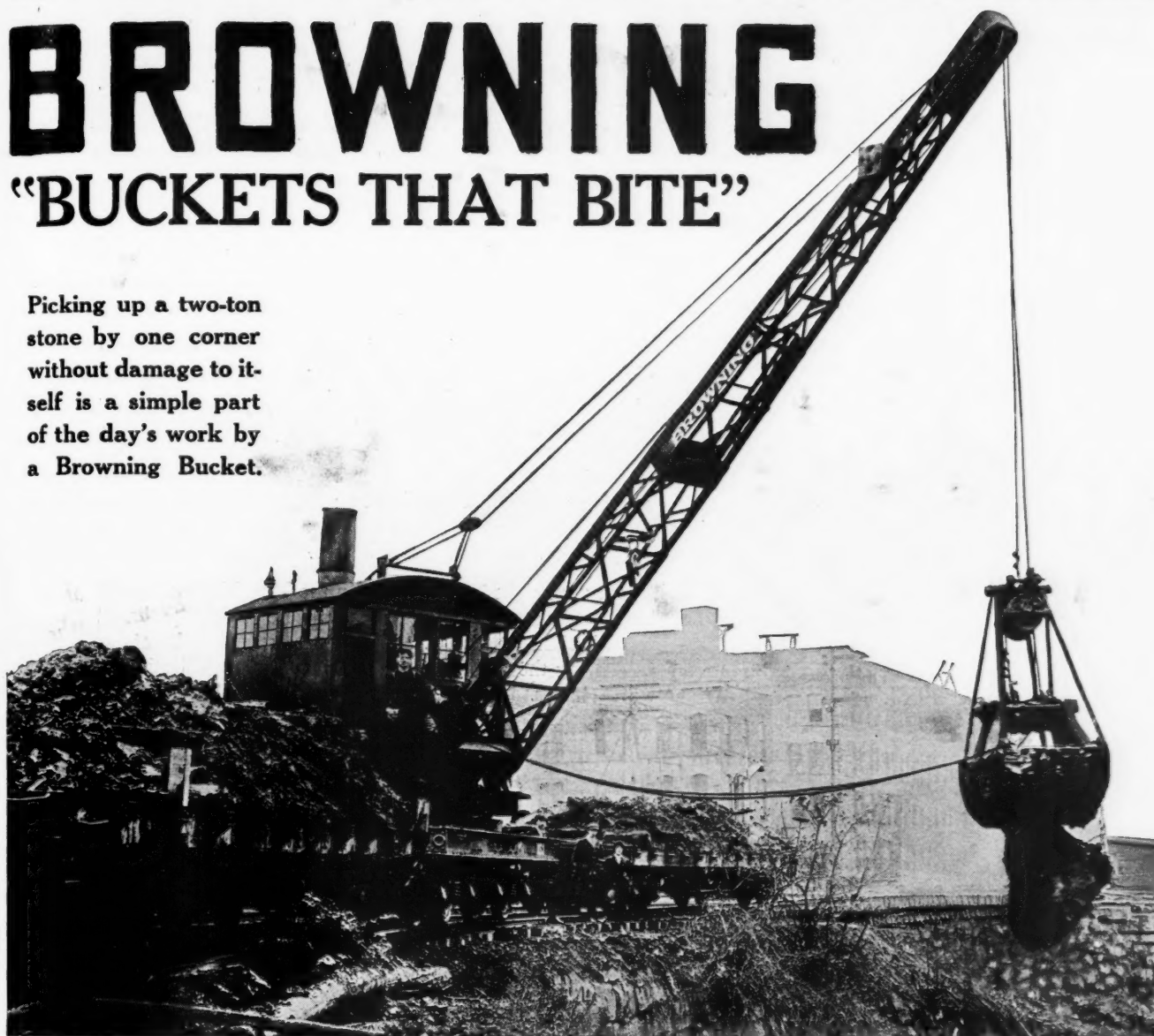
CATALOG SENT FOR THE ASKING

Manufactured Under Exclusive License and Sold Only by
Chalmers & Williams, 1440 Arnold St., Chicago Heights, Ill.

BROWNING

"BUCKETS THAT BITE"

Picking up a two-ton stone by one corner without damage to itself is a simple part of the day's work by a Browning Bucket.



A Graphic Illustration of Power

FEW things could more strikingly portray the irresistible gripping or closing power of Browning Buckets than this accidental test. Two facts stand out prominently: first, that it is possible for a bucket designed for general work to have such great closing power; second, that such severe tests need not damage the bucket.

Furthermore, it is an ample demonstration of the "digging" power of *Browning Buckets*.

It's the full bucket that pays the dividends. Half-loads mean double the cost per yard of material handled.

Browning Buckets are fitting companions for Browning Locomotive Cranes, "The All-Around Champions." A wide range of usefulness insures their dividend-paying ability. Catalogs of both buckets and cranes give graphic illustrations of the variety of work possible. A request brings them to you.

The BROWNING CO., Cleveland, O.

SALES OFFICES: New York Chicago

For better service say, "I saw it in ROCK PRODUCTS"

-- and behind the Allies and Worthington, the Men who stayed at Home

JUST as our army in France steadily and surely fought back the German lines, so did those who worked in factories here at home just as steadily and just as surely help the great war machine advance toward victory.

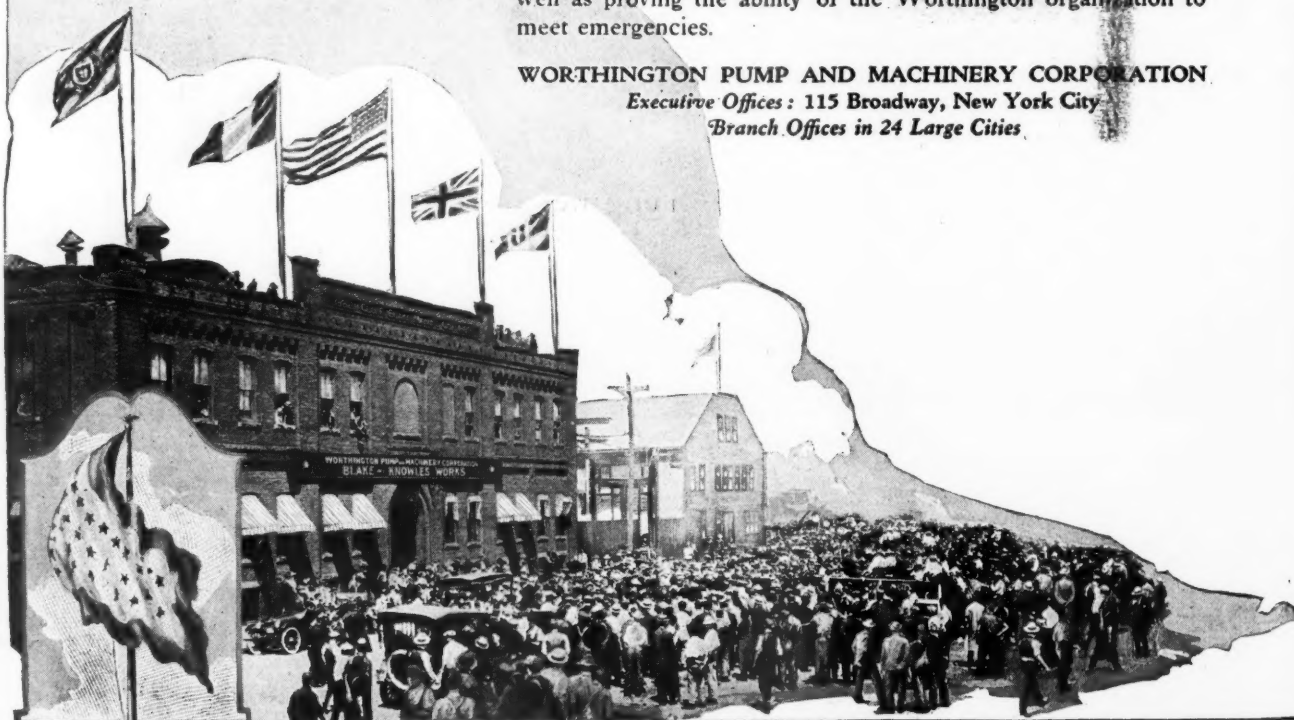
In the Worthington factories, for instance, the thousands who worked day and night made equipment for practically every branch of the service. For the Navy, Worthington pumps and compressors of every type and description were made by the thousand. For the Emergency Fleet, giant marine engines were delivered at the rate of three a week. For the Army, for munitions plants, for explosive factories, Worthington machinery was furnished in such vast quantities that every one of the eight Worthington factories produced more than ever before.

With more than eight hundred stars in the Worthington service flag, the fact that new production records were made speaks well for the enthusiasm and spirit of those who stayed at home, as well as proving the ability of the Worthington organization to meet emergencies.

WORTHINGTON PUMP AND MACHINERY CORPORATION

Executive Offices: 115 Broadway, New York City

Branch Offices in 24 Large Cities



PUMPS-COMPRESSORS-CONDENSERS-OIL & GAS ENGINES-METERS-MINING-ROCK CRUSHING & CEMENT MACHINERY

WORTHINGTON

Deane Works, Holyoke, Mass. Hazleton Works, Hazleton, Pa.

Blake & Knowles Works
East Cambridge, Mass.
Worthington Works
Harrison, N. J.

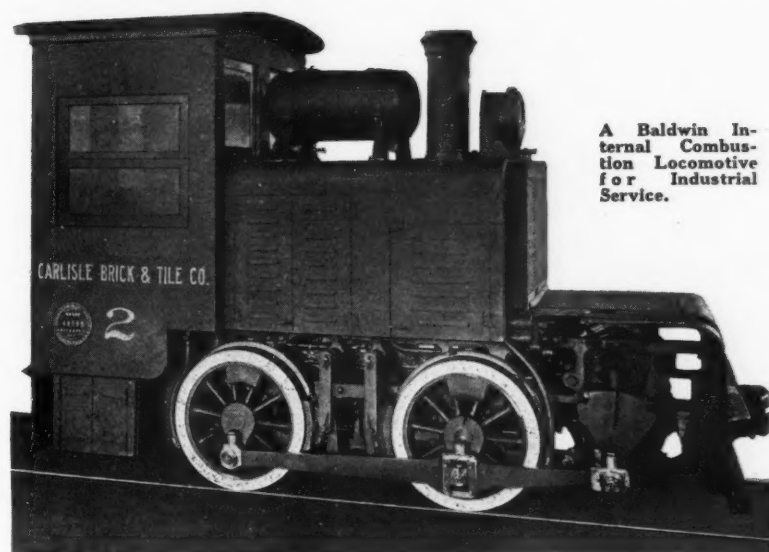


Laidlaw Works, Cincinnati, Ohio Gas Engine Works, Cudahy, Wis.

Power & Mining Works
Cudahy, Wis.
Snow-Holly Works
Buffalo, N. Y.

The advertiser wants to know that you saw his ad in ROCK PRODUCTS

Baldwin Service



BALDWIN SERVICE is by no means confined to the designing and building of new locomotives. There are other features of our work, which are of special interest and importance to all operators of Baldwin engines.

All of our locomotives are built to gauges and templates, so that duplicate parts, guaranteed to fit, can be furnished for any Baldwin engine. Such parts are given preference in manufacture, hence prompt shipment is assured. You can therefore repair your power in the shortest possible time, even though your shop facilities may be limited.

If your locomotives are in need of a general overhauling, and you cannot handle the work, send the engines to our shops, and we will put them in first class repair. We have complete facilities for overhauling, rebuilding and modernizing locomotives, and are prepared to render contractors and industrial railways an important service by doing work of this kind.

If your locomotives are not Baldwins, we can manufacture repair parts from blue-prints furnished. And if you are in need of new motive power, we will make a special study of your conditions, in order to determine what types of locomotives will be best suited to your work.

The Baldwin Locomotive Works

Philadelphia, Penna.

You will get entire satisfaction if you mention ROCK PRODUCTS

AETNA DYNAMITE

"LION" ELECTRIC BLASTING CAPS

"LION" BATTERY

PROPER LOADING

An Aetna Combination that will unlock any blasting problem!

AETNA DYNAMITE—of a particular grade that will suit your individual requirements—should be the first point to turn to on your dial of blasting problems, because it is so made as to represent, figuratively, when properly loaded, the right "tumbler" in your locked-up strata. And, Aetna Dynamites differ essentially from most brands in that they produce less fumes.

Turning to "Lion" Electric Blasting Caps, they contain a Fulminate of Mercury charge, which makes them the most dependable and efficient detonator known. We direct your attention to the .30 calibre diameter of "Lion" Electric Blasting Caps. The advantage of this diameter shell is that it gives the maximum concentration of charge, which is of vital importance. If a smaller diameter shell is used the same sized charge would be proportionately longer, and instead of a powerful blow being delivered upon a small area—such as our .30 calibre shell gives—there would be a diminished one over an extended area, with the possibility of imperfect detonation.

Then turning to Proper Loading, we find a point that is often out of true in general practice. We will mention here only one instance: We have known of blasters who have put an Electric Blasting Cap with a four-foot lead in a

hole twenty feet deep and then attached light connecting wire to it because it is cheaper than the longer wires of a twenty-foot Electric Blasting Cap which are made to withstand a greater pressure. No matter how carefully a joint is made, there is more resistance to the firing current in a joint than there is in solid wire. This idea—and we have seen it used many times—is a mighty expensive attempt at economy. Proper loading, from the first stick of dynamite to the top of the tamping, and the making of proper connections, is all important.

Finishing up the combination with a "Lion" Blasting Machine, we have in it a powerful dynamo, simply constructed, yet in such a way, and of such materials, that it withstands hard usage and comes as near taking care of itself as any machine can.

AETNA EXPLOSIVES COMPANY, Inc.

NEW YORK CITY

BRANCH OFFICES:

Birmingham, Ala.
Buffalo, N. Y.
Chicago, Ill.
Denver, Colo.

Duluth, Minn.
Joplin, Mo.
Louisville, Ky.

New Orleans, La.
Norristown, Pa.
Pittsburgh, Pa.

Pottsville, Pa.
Roanoke, Va.
St. Louis, Mo.
Wilkes Barre, Pa.

Prompt attention will be given your inquiry if you mention **ROCK PRODUCTS**

Rock Products

TRADEPRESS PUBLISHING CORPORATION

542 SOUTH DEARBORN STREET

CHICAGO

NATHAN C. ROCKWOOD, Editor

C. F. TREFZ, Associate Editor

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vice-president; George
P. Miller, Treas.; C. H.
Fuller, Secy.

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on wrappers indicates
issue with which your
subscription expires. In
writing to have address
changed, give old as
well as new address.

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of March 3, 1879.

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August 2, 1919

Printing of this issue, 4,000 copies

Second class entry at U. S. Post Office.

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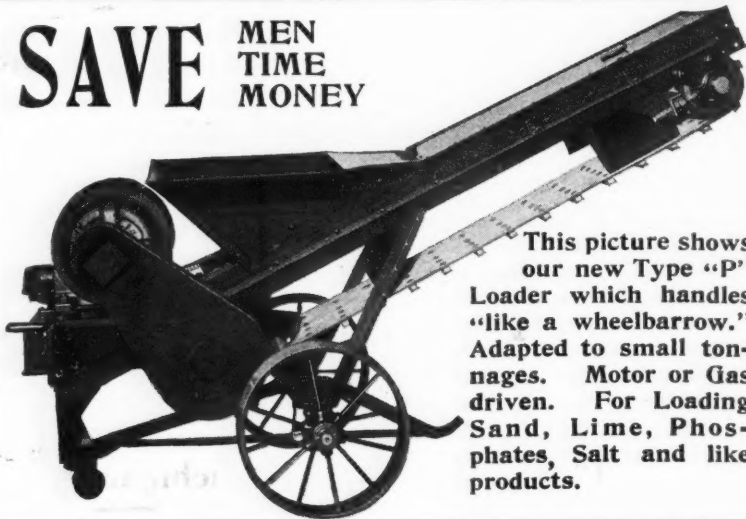
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Rock Products

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Chicago, August 2, 1919

No. 16

Capital, Labor and Brains — These Three — But the Greatest of These is Brains

ANDREW CARNEGIE WAS ONCE ASKED, according to report, to name the elements of success in industry; to which he replied, "Capital, labor and brains." On being asked to name the most important one of these, he shrewdly asked his questioner, "Which is the most important leg of a three-legged stool?"

Hitherto brains have been more closely allied with capital than with labor, and so these brains have been more employed in adding to the profits of capital than in adding to the comfort and happiness of labor.

Now the conditions are changing. Capital has no monopoly on brains. The laboring man has been educated by present conditions and circumstances to want something more than he had before. It may be that

he really doesn't yet know what he wants; but he feels that he is in a transition stage toward something better.

Manifestly it is folly for any employer of labor to expect to set things right by a return to former conditions. The autocratic employer has gone along with other forms of autocracy.

Nor will the autocratic employer give place to the labor union dictator. The laborer will soon be able to distinguish that they are both in the same class with Herr Wilhelm Hohenzollern. One way of eliminating both is by the introduction of industrial democracy.

There probably are other means of accomplishing the result by the use of brains, but the principles are the same in all—tolerance and a mutual understanding and regard for the rights of others.



Industrial Democracy Stops Strike

How Plan Settles Troubles—What Occurred in a Passaic Plant

By B. C. Forbes

Editor, Forbes Magazine

THE WORKERS of one plant stood solid through all the recent strikes at Passaic, N. J. Peace was preserved there by the introduction of Industrial Democracy, just as peace, harmony, fatter pay envelopes and better profits have been brought about at a score or more of other plants by Industrial Democracy, the method evolved some ten years ago by John Leitch and now sweeping the industrial world.

This method of running a business is not a beautiful, theoretical idea or ideal, which merely looks well on paper. It is a plan which has been tested and tried in almost every variety of business and in only two isolated instances has it failed to achieve results far beyond the expectations of both workers and employers. It works because it is founded on the square deal, because it deals in man-to-man fashion with workmen, because it gives men and women a genuine voice in governing the conditions under which they work, because it invests workers with a sense of responsibility which is impossible under the ordinary, autocratic way of running a concern by directors and executives without heed to the ideas of the workers themselves.

Industrial Democracy, it is my conviction, after study and investigation, is bringing a genuine solution of the labor problem as it exists in many corporations. Since it has worked with extraordinary success in all kinds of mills and plants and factories during the last ten years and is now hailed by enlightened employers all over the country, there is no manifest reason why it should not be indefinitely extended.

When the strike fever broke out in Passaic the workers in the Passaic Metal Wire Company felt about as fidgety as those in other plants. The management had no reason to expect that its works would be immune, notwithstanding that it had always sought to treat the workers fairly and to provide them with ideal environment inside and outside the shops. As a matter of fact, murmurs were heard in this plant just as they were being heard in other Passaic plants.

The first thing Mr. Leitch did before he will consent to introduce his plan was to get together every director and every executive, describe frankly to them what his methods were, explain the difficulties

that would have to be overcome before the advantages could be derived, and then satisfy himself that the directors and the chief executives were anxious to do the right thing by their force. Mr. Leitch then proceeded to call a mass meeting of every man and woman and boy in the organization.

He let them know that he came there as one who was sincerely interested in

THE FOLLOWING is the first of a series of articles descriptive of a system of handling labor which has won phenomenally successful results and which is being taken up with avidity by corporations all over the country. Until lately the plan was not given to the public. The writer of this series, B. C. Forbes, has studied and investigated at first hand the operation of the plan. Mr. Forbes will present the views of both employers and workers who have had practical experience with Industrial Democracy.

While this article deals with a factory labor problem it is in no essential respect different from the problem every employer of labor, great and small, is now facing.

their happiness, as one who had been able to increase the happiness and the wages of many thousands of workers at other plants, and as one who would see to it, if they voted to give him a chance to explain what he proposed, that their lot would be improved—if they, in their turn, were willing to play fair with the management.

The System of Democracy

The next step was to outline the system of democracy under which it is proposed, if the workers so vote, to assist to run the works. Briefly, Mr. Leitch's individual system is patterned after the form of government of the United States. The chief executive becomes president; the Cabinet consists of the directors and principal officers; the Senate is composed of the other executives; the superintendents, foremen and others having charge of workers; while the House of Representatives, the basis of

the whole system, is chosen by the workers themselves, through secret ballot. The House of Representatives consists wholly of the rank and file of the workers. Each department selects its own representative or representatives, there usually being one representative for every twenty-five or thirty or forty workers.

Mr. Leitch addresses the whole body of the workers somewhat in this fashion: "I think the trouble with this company and with you is that we have no common business policy—a single policy which will be that of the company and of every man in this room. Did you ever think how easily matters would run if both the company and yourselves were working along the same lines, if you were all out for the same thing and willing to work together in the fairest, squarest manner? If we have a policy it should be put down in black and white and hung up on the wall. You can carry copies in your pocket, and you can make it a rule of your conduct in everything.

"I am not going to give you a policy. I am going to ask you to adopt one for yourselves. It will have four cornerstones and a capstone, but I am going to suggest only one a week. We will take one today, talk it over, and then vote on it. If you vote 'Yes' we will lay the second cornerstone a week from today, and then you can vote on that. But if this cornerstone or those which we may talk about on any later day does not suit you I expect you to vote 'No' and we will quit. There is absolutely no use in having a business policy unless everybody agrees to it, and by everybody I mean not only the president of the company, but also the truck men and the office boys. I suggest, as fundamental, the first cornerstone—Justice."

After explaining that justice must always be two-sided, that justice must be meted out to others before it can be demanded for oneself, and after pointing out that the practice of justice insures a square deal for every one, from office boy or floor sweeper to president, Mr. Leitch offers the following as the first cornerstone of the policy to be adopted:

We, the Employees, Officers and Directors, recognizing that Justice is the greatest good and Injustice the greatest evil, do hereby lay and subscribe to, as the first cornerstone of our policy, this greatest of all good.

The fullest meaning of this word shall be the basis of all our business and personal dealings—among ourselves as individuals, between our company and those of whom we buy, and between our company and those to whom we sell.

Justice shall be the first cornerstone upon which we agree and determine to construct broader character as individuals and broader commerce as an institution.

We recognize that justice to ourselves necessitates taking advantage of every opportunity to do the best that is in us and each day improve that growing ability.

We realize that merit must be recognized whether in ability or merchandise. With this assurance we cheerfully, hopefully and courageously press forward to certain and unqualified success.

Usually a week is allowed between meetings, so that the whole idea can have time to sink into the workers' minds. Incidentally, all meetings are held in the company's time, those on regular wages receiving their full pay, while those on piece work are paid what they would have earned during the time consumed by the meeting.

The second cornerstone laid before the workers is Co-operation, worded thus:

To accomplish the greatest possible results as individuals and as an institution we find Co-operation a necessity.

We recognize that business without Co-operation is like sound without harmony. Therefore we determine and agree to put together and freely offer, and work with, the spirit of that principle—Co-operation.

So we shall grow in Character and Ability and develop individual and Commercial Supremacy.

Differences of opinion shall be freely and fearlessly expressed, but we shall at all times stand ready to Co-operate with and heartily support the final judgment in all matters.

The next cornerstone is Economy, as follows:

As each moment is a full unit in each hour and each hour a full unit in each day, so each well-spent unit of thought and well-spent unit of action makes for each victory and the final success.

When the hour, the day, the year, or the life is filled with well-spent ability, and an institution is composed of individuals who recognize the value of and so use their time, then success is controlled and governed and there is no longer vague uncertainty or a blind and unreasoning hope.

Life is like a bag in which, each moment we place a unit of value or of rubbish, and our present and future happiness depends upon the contents of that bag.

Recognizing that Economy is time, material and energy well-spent, we determine to make the best use of them, thus so shall time, material, and energy become our servants while we become the masters of our destiny.

The final cornerstone is Energy:

As energy is the power back of action, and action is necessary to produce results, we determine to Energize our minds and hands, concentrating all our powers upon the most important work before us.

Thus intensifying our mental and physical activity, we shall "Make two grow where one was," well knowing that our Individual and Commercial Crop of Results will yield in just proportion to our productive and persistent activity.

This power of Energy directed exclusively toward sound and vigorous construction, leaves

no room for destruction and reduces all forms of resistance.

Service

By the fifth meeting they are usually ready for this capstone, Service:

We believe that the only sure and sound construction of success as an individual or an institution depends upon the quality and quantity of service rendered.

We neither anticipate nor hope to be unusually favored by fortune, but are thoroughly persuaded that fortune favors the performer of worthy deeds and of unusual service, and we therefore determine that our days and our years be occupied with such performance.

Quality shall always be the first element of our service and quantity shall ever be the second consideration.

Thus shall we establish not only the reputation but the character of serving best and serving most.

Therefore, by serving admirably, we shall deserve and receive proportionately.

Mr. Leitch told them that they were going to save money under the new plan—that they were going to get more work done; that it would not be a square deal for the company alone to take the money that they had saved, but instead that they would split up the savings 50-50, that is, as the books of the company showed savings in the cost of operation, the amount saved would be divided into two parts—one would go to the company and the other would be distributed every two weeks to the men as a dividend on wages.

I attended what I think was the third meeting held at the Passaic Metal Ware Works. Whereas less than one month previously the talk was all of strike, there was not a single thought or word of a walkout or trouble of any kind; every worker, male or female, was engrossed in building the new working structure. The proceedings at the House of Representatives' session were particularly interesting to me, as the representatives consisted wholly of the rank and file of the workers who had been chosen by their co-workers, men and women, to talk and act for them.

Mr. Leitch, who acted as chairman, asked how things were going.

One representative said that he had spoken to a fellow worker who was not making the best use of his time, but he got slight thanks for his pains. Another representative, a young woman, said that she had had a similar experience.

Running the Gauntlet

"Of course, you will encounter difficulties," Mr. Leitch told them. "But your fellow-workers selected you as representatives because they thought that you were the best qualified of the whole bunch for meeting difficulties and straightening them out. This job of being a representative isn't any snap. It is a big honor, but, like most honors, it carries with it responsibilities and difficulties and problems. You have got to prove men enough and women enough

to tackle and solve these difficulties and problems. I don't know whether you have courage enough to stand the gaff—but I do think you have.

"You know how the Indians who used to inhabit this very spot on which we are meeting tested the youths who aspired to be received into the warrior class. They stuck a pole into the ground with a long thong hanging from the top, and on the end of the thong was a hook. The young warriors formed a circle around the pole and then one of the veteran warriors—all the other warriors in the neighborhood were on hand for the ceremony—pulled on the hook until the pole bent over and then let go. The hook went swishing and slashing in every direction. If one of the candidates as much as batted an eye he was rejected in disgrace. The hook would rip open a chest here, tear out an eye there, slash the cheek of a third—but all the time the young warriors had to stand their ground. Can you stand your ground, can you stand the gaff? As I look at you and size you up, I believe you can."

This straight-from-the-shoulder talk had a favorable effect. I could notice the men square their shoulders. One girl declared that she knew that she was doing the right thing in trying to get some of the other girls to stop wasting time and material and she was willing to swallow their jibes. She knew it would be all right in the end when they understood as clearly as she understood that the waste and the idleness was taking money out of the pockets of everybody in the works.

The force was working on a fifty-two and one-half-hour week schedule. Mr. Leitch explained that the Senate had discussed the feasibility of cutting the hours down to fifty a week without incurring any decrease in production or any lowering of the earnings of those on piece-work. Mr. Leitch added that from his experience in other plants he believed that they could lop off the two and one-half hours and not only maintain production, but increase it. It was his strong belief that if everybody was on hand to start work right on the dot, if nobody threw down their tools or quit their machines until the whistle actually blew at lunch time and at closing time, the greater part of the two and one-half hours would be saved by this means alone. He said that while they had had a fifty-two and one-half hour week, lots of the workers had not given fifty-two and one-half hours' actual service. "Suppose," he added, "we all make up our minds to work—work, mind you—the full fifty hours by being at our place ready to begin work promptly (and do not start to wash our hands or clean up until the whistle blows. I am certain the results will astonish most of us."

There was universal support of this suggestion, and it was finally voted to put it into operation the following week.

One representative intimated that some of the men were talking of a forty-eight-hour week.

"That's the stuff," Mr. Leitch immediately agreed. "The forty-eight-hour week is what I call the real working week. But as we don't want anybody's pay envelope to suffer a single dollar, don't you think it will be better if we don't try to rush matters all at once? I mean, won't it be wiser for us to go on the fifty-hour schedule next week and then when we have convinced ourselves as I know we can in a few weeks, that we can do as much work and make as much money in the shorter hours as we did in the longer hours, then we will be ripe for going to forty-eight hours. What does everybody think?"

There was universal support of this view. And the representatives agreed to recommend this course and to explain to the others that the forty-eight hour week was the definite goal, but that it would not be wise to make too drastic a cut all at once.

Not "Hands" But "Co-Managers"

Mr. Leitch took occasion to impress upon the workers that in this world one must never expect to get anything for nothing, that in return for shorter hours, in return for their admission to a real part of the running of the business, in return for their half of the increase in the profits, they would have to give a full return, a full return in the way of loyalty, enthusiasm, economy, greater carefulness in avoiding wastage of material, greater punctuality and a real spirit of teamwork. He told them that, under Industrial Democracy, their status as they could see, had been infinitely raised; they were not simply "hands," they were co-managers of the business. Nothing could be done without consulting them or without their consent. Hereafter, although they had had a part—those of them who were citizens—in running the affairs of the nation, they had not had very much part in the running of their plants. Now all is changed.

The men and women returned to their benches and their machines in such a spirit that, if any labor agitator had dared to suggest a strike at that works, he would have run the danger of being mobbed and mauled.

The Passaic Metal Ware Co. kept going though thousands upon thousands of workers at other plants were out in rebellion against their employers.

(Copyright B. C. Forbes.)

NOTE—The second article will show how successfully Industrial Democracy is working out—the acid test as it were of its practicability.

Stabilization of Wages Needed to Revive Building Activities

New York Business District Reports Increase of Construction Business

WHEN it became apparent to officials of Boston, says The Dow Service Daily Building Reports, that the skilled building trades employees were bent upon successive demands for increases in wages and it became apparent that if the housing situation is ever to be relieved, some stabilization of workingmen's wages on building operations would sooner or later have to be worked out, the mayor called the leaders of the building artisans to a conference and proposed that a general wage scale be fixed applying to all lines and that this agreed-upon top price be held for a definite time, sufficiently long to permit owners to proceed with building plans that had for the most part been indefinitely abandoned.

cerned with repressing tendencies to advance prices than they are to suggest them.

Except for the price advances already planned for and announced in recent surveys by The Dow Service Daily Building Reports, the building material market is steadier, as to upward price movements, than it has been at any time since July, 1917. The appearance of an unexpected foreign buying movement on a cash basis, and the prospects of a temporary cessation of retail price advances, with the sudden change about in new construction work, have combined to make the distributing trade uneasy.

John P. Kane, of John P. Kane Co., one of the most conservative building distributors in this city has pointed out the danger of continued price advances and while he is not an alarmist, he reflects the attitude of the best minds in the building trades when he says that the best way to solve the terrific space shortage everywhere is to keep the price of materials within reach of the prospective consumer. "The building movement has started under great handicap. It needs nourishing, not nipping."

The chief centers of latest activity is in the heart of the city where investors have been afraid, up to the present time, to proceed with construction plans. Seventh Avenue in the upper thirties, and streets in the forties, from Tenth Avenue to Lexington are scenes of greatest activity and before another 30 days the rat-tat-tat of the steel riveter and the exhaust of the foundation caisson cage will again be heard in the financial district where it has been silent almost since the time when the Equitable building was under construction, as the Cunard Company's skyscraper rises to alter the lower city's skyline. Brooklyn is beginning to follow the lead of Bronx and Westchester for actual construction activity, the two latter sections already resembling the days of 1912 for building activity in the Washington Heights district.

With all this sudden revival of building the danger of stampede for materials and supplies becomes more acute, especially in view of the light stocks being carried by supply men. Crops will soon begin to move, and railroad congestion will hinder quick shipments from mills to distributors. This fact is responsible for the rush to get building work under way, but more of it would be moving it some plan could be worked out for stabilizing the wages of skilled building artisans.

Quality and Service Is the Text of the Salesman

THE ART OF SELLING has been so analyzed and understood that definite principles have been laid down; therefore, salesmanship is a science.

Like men in any other vocation, salesmen may be classified. There are those who can dispose of large volumes of dollars at 75 cents each; some can even get as much as 90 cents; then there is the highly efficient salesman who often obtains a premium. Usually he talks quality and service all the time, thinking of price only as a necessary feature and, when possible, not until after the sale has been made.—*Illinois Sand and Gravel Producers' Bulletin.*

At a conference of the Building Trades Employers here on Wednesday there was talk of radical wage-increase demands among the skilled building artisans here and it was decided to investigate the merits of the Boston idea.

There is hardly a building material interest in New York who is not outspoken in his belief that building material quotations for this year have about reached top, except in so far as new freight rates, towing charges and labor increases at manufacturing points are concerned. With the building season more than half gone and with such a continuing wide discrepancy between the volume of building plans filed and actual work started, building material distributors and manufacturers are more con-

Ship Cranes for Quarrying Operations

Quarry and Crushing Plants in Montreal, Quebec, Have Some Unique Features—
City Deliveries by Trolley Cars

A LARGE PART of the city of Montreal, Que., is underlain with rock—a kind of bastard trap known locally as "Banc Rouge." It is apparently a combination or intermixture of trap rock and limestone, caused probably by the upheaval of molten trap rock from below the limestone strata, which filled the cavities and pores of the limestone with the harder trap. It makes an excellent commercial crushed stone and is sold at prices ranging from 90 cents to \$1.75 per ton, f. o. b. plant, according to size, the smaller sizes of course bringing the higher prices.

The plants for getting out this crushed

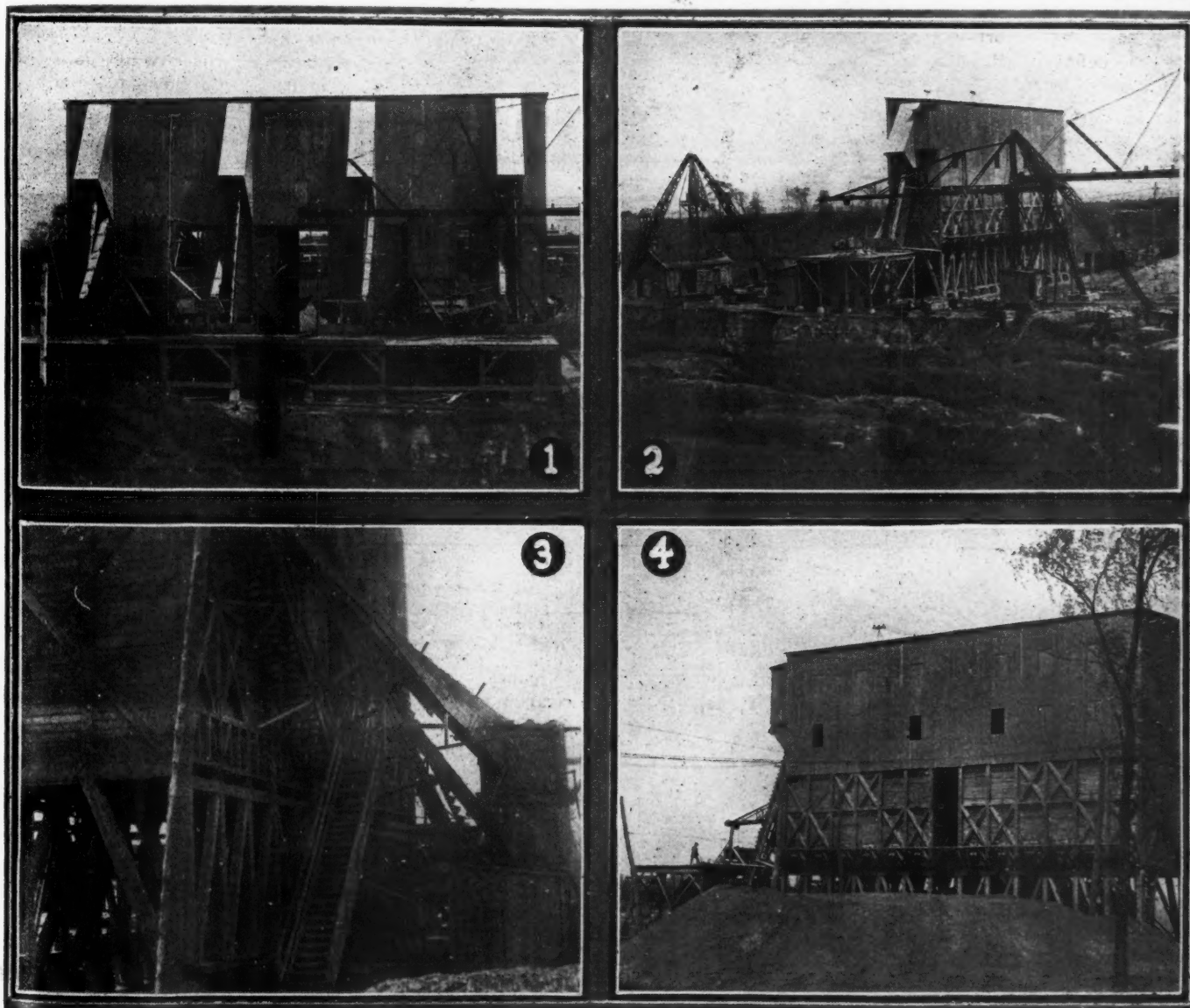
stone are, it seems, peculiar to the Montreal district. There are a number of them in outlying parts of the city, but they are all about of the same general design, with daily outputs of from 300 to 500 tons. Their shipping facilities are generally provided by teams, motor trucks or trolley cars.

The quarries are mostly of the pit type. The stone is loaded by hand by the piecework system into cars of 5 cu. yd. capacity. These cars are merely skips which rest on four-wheel truck frames. The loaded cars are pushed by hand to the side of the quarry nearest the crushing plant, where jib cranes pick the skips

off the trucks and dump the skips into the crushers.

Ship Cranes for Stone Handling

The cranes used for this purpose are the revolving type of ship or jib crane often seen on wharves along the water front for handling the cargoes of ships. The first ones used in this vicinity were made in Scotland by manufacturers of marine equipment. In fact until the war interrupted ocean traffic, all the Montreal quarry cranes come from Scotland. The two most recent installations, however, those for the new plant of the Morrison Quarry Co., illustrated on the front cover of ROCK PRODUCTS, July 19, 1919, were



(1) Old plant of the Morrison Quarry Co., Montreal, Que.; (2) New plant of Morrison Quarry Co.; (3) Recrusher of new plant, showing shipping side of bins

made by a structural steel company in Montreal. Any bridge builder or structural-steel fabricator could construct one.

These cranes are built like a stiff-leg derrick with a horizontal swinging boom, which carries a traveler. The operator occupies a small house over the pivot. They are fixed cranes and of course have a working radius equal only to the length of the boom, which in the latest cranes is 80 ft. long.

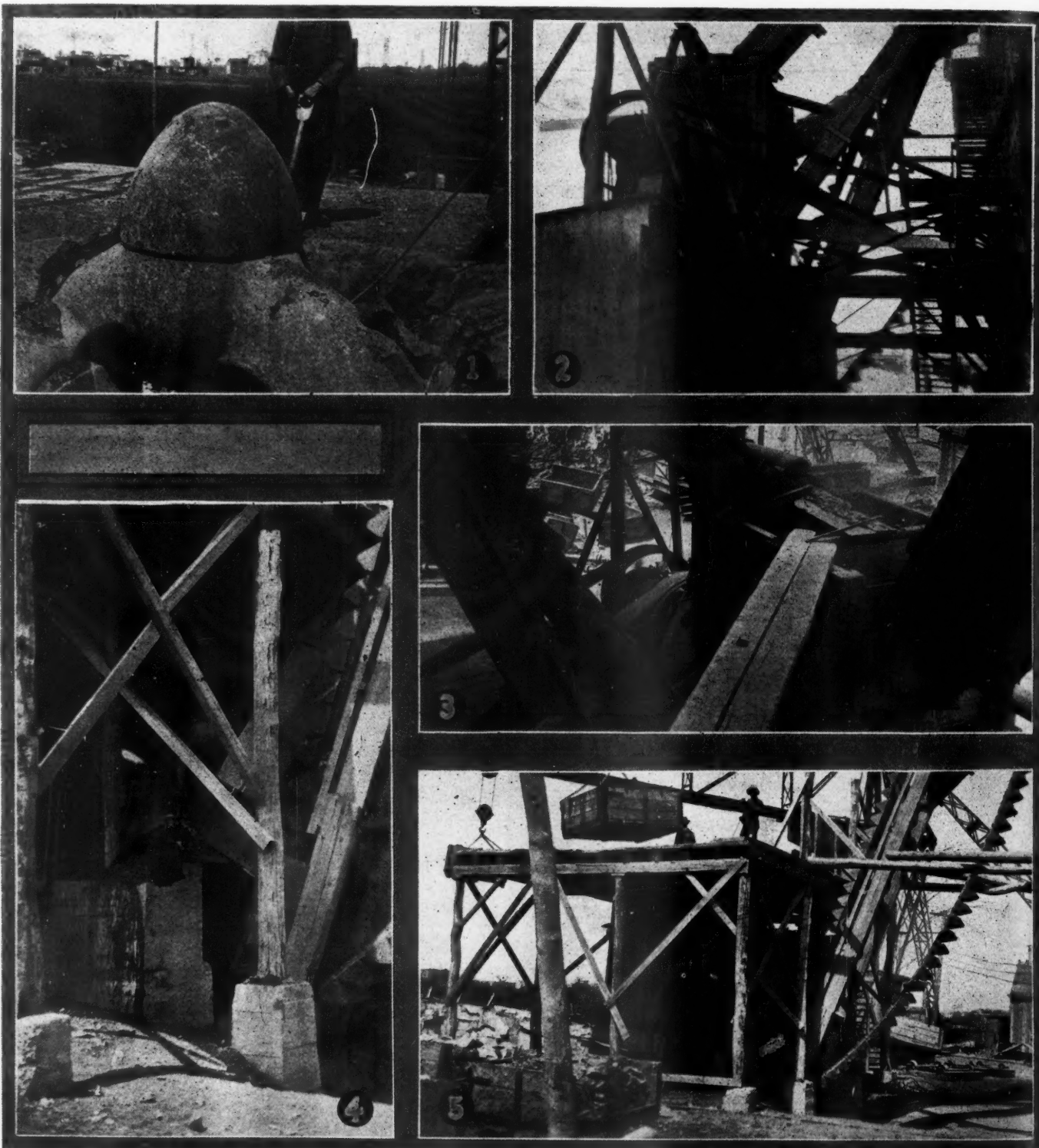
Two cranes serve each crushing plant. The skips are hoisted on a three-line cable and are dumped by the crane operator. Two of the lines are attached to the two back corners of the skip, while the third is fastened to a ring in the middle of the front or dumping end. The front line is released when the skip is deposited on the dumping platform by a crusher tender. The crane operator then raises the skip by the two rear

lines, releasing its load.

The initial crushers are mounted under elevated platforms in front of the screening plant. This crusher feeds a bucket elevator which dumps the stone into sizing screens at the top plant. The screen rejections are chuted to recrushers, also outside of the screening plant.

Old and New Types of Plant

The two views, Nos. 1 and 2, on the first page of this article illustrate two

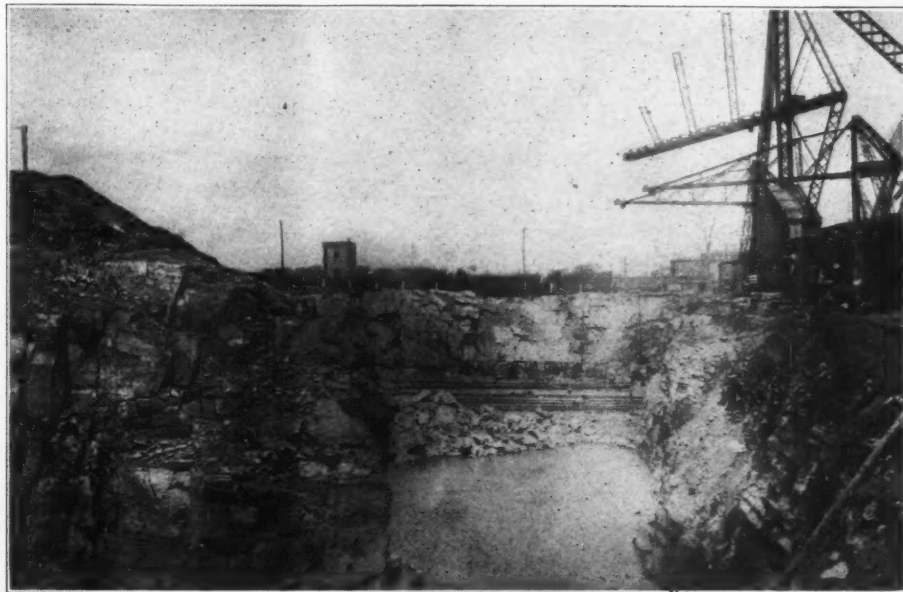


(1) No. 8 gyratory mounted on elevated platform; (2) Disk recrusher and feeding spouts; (3) Feeding arrangement of disk recrusher; (4) Setting of No. 8 gyratory; (5) Initial crusher fed by ship cranes

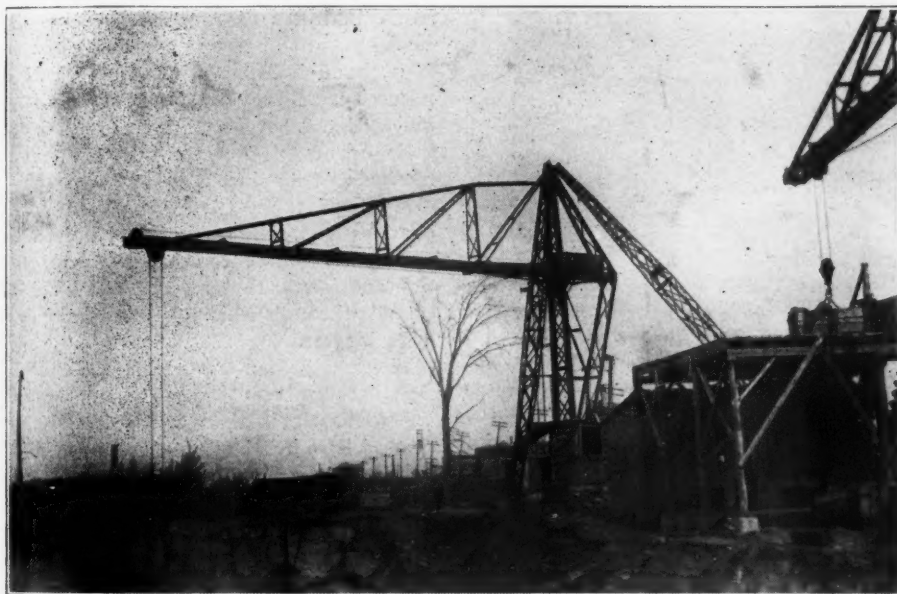
types of plant, the old and the new, operated by the Morrison Quarry Co. Each has about the same capacity, namely 500 tons daily. The old plant consists of four distinct but identical units. There are four No. 5 jaw crushers mounted on a single platform. These are fed by two ship cranes of 60-ft. boom each.

From the crushers the stone is elevated by four bucket elevators to four 36-in. by 20-ft. revolving sizing screens. The rejections from each screen are returned to the primary crusher platform by four chutes alongside the elevators. The recrushing is done not in the primary crushers but by four 24-in. disc crushers mounted alongside the jaw crushers. The recrushed material then flows through the screening plant by the same route as already described.

In the new plant a single No. 8 gyratory crusher does all the primary crushing. The sizing is done by two



View of quarry showing both old and new cranes



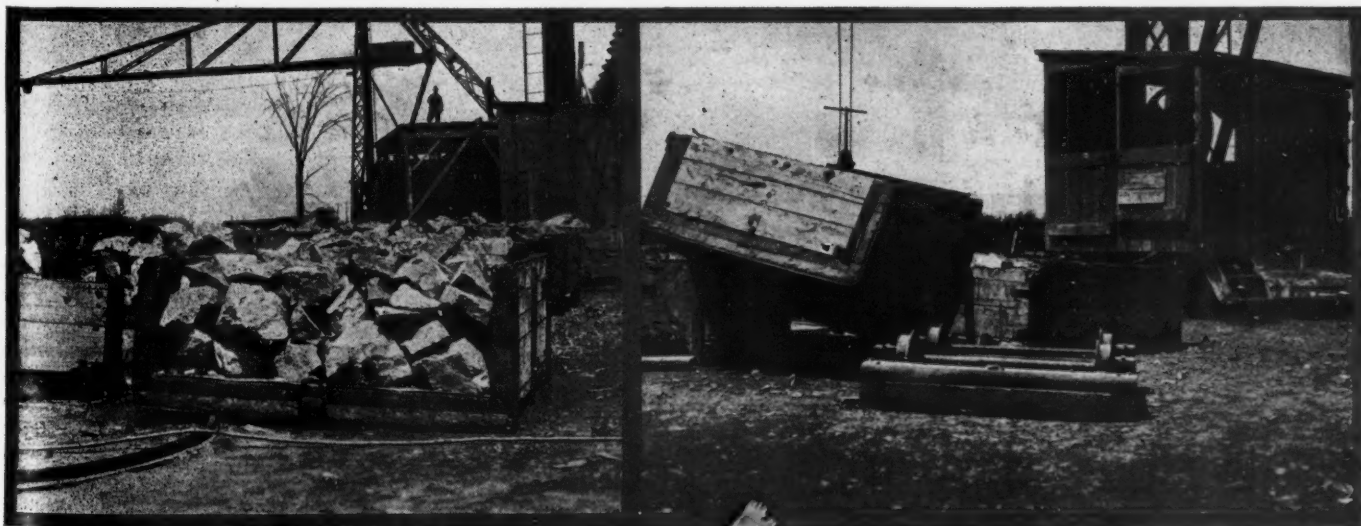
Jib crane used for lifting skips from quarry

48-in. by 24-ft. revolving screens, in series, or one following the others. The screen rejections are chuted to a single 48-in. disc crusher, mounted on a platform on one side of the screening and bin house. The product of the recrusher is of course fed back to the sizing screens by a different elevator than that from the primary crusher.

In all respects the new plant represents a big saving in operating costs over the old plant, not only in the less labor required but in the maintenance of equipment.

On a pinch five men at the plant can operate it—the crane man, two men to hook the skips on and off, the crusher tender and a plant machinery man. The size and nature of the skip-cars and the size of the crusher necessitate hand quarrying, but blasting is done by well drilling and with fairly large charges.

The plants of the Morrison Quarry



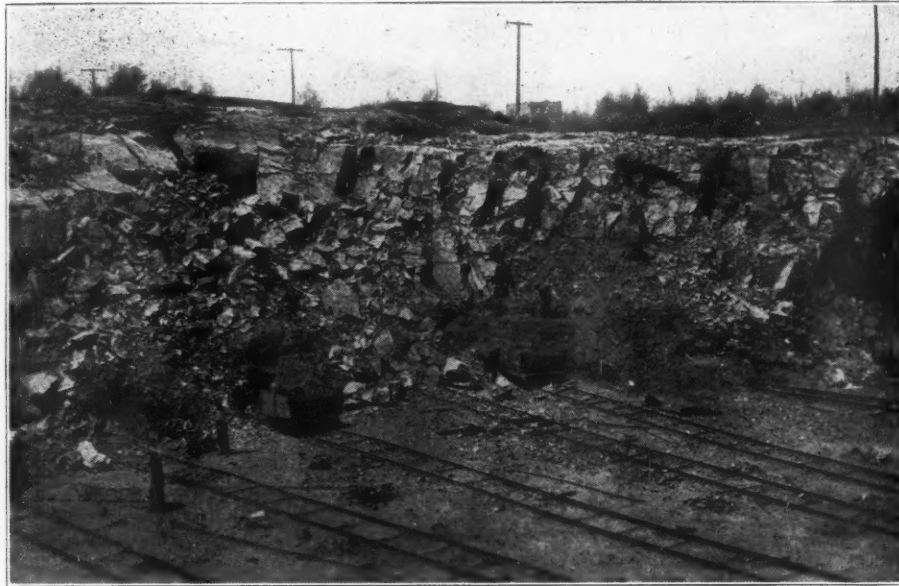
Kind of skip and car truck used in quarry—crane control house

Co., illustrated in this article, have connection with the Canadian Pacific Ry., but several plants in the same vicinity have only trolley car connections, or deliver entirely by team or motor truck. The Morrison plant makes practically all of its city deliveries by trolley car.

The overhead trolley wires in the storage yard seriously interfere with the handling of the stored material. A lo-

comotive crane of course cannot be used. At present the company loads out of stock piles by hand shoveling and wheelbarrows and runways, but this of course is very expensive, and other means to load the stored material are being investigated.

The superintendent of the two plants illustrated herewith is J. M. Martineau, of Montreal, Que.



Quarry view—hand loading

War Department Discontinues Promotion of Public Works

THE WAR DEPARTMENT has discontinued the promotion of construction of public works. The record shows more than \$450,000,000 under contract.

This is reckoned as a little more than a third of the public work available, but the War Department reports that the labor surplus has disappeared and believes that further forcing of public construction would unnecessarily increase the cost of private construction.

In the order discontinuing the work is this statement:

"From various sources information received indicates that there has been a general clearing up of the industrial situation, an increase in the amount of general production, a decrease in unemployment, and in fact many localities report a shortage of labor. From the point of view of the war department as well as from a general economic standpoint, the stimulation of public works was one way of overcoming a crisis in the employment market, particularly as regards discharged soldiers."

But the statement says that this crisis seems to be passed and then adds:

"In short, special activity of public works has been regarded as most desirable in a time of stress, furnishing a reservoir to absorb labor in periods of idleness, but if this activity is continued

in a time of general commercial activity which is now confronting us, it would have a tendency to shoot up prices and deter private building which after all is the primary public need and the source of production and taxation. Thinking along these lines it now seems advisable to discontinue the stimulation of public works immediately."

The Controversy Over Proposed New Bill of Lading

THE EXTENSIVE CONTROVERSY which has grown out of the proposed adoption of new bill of lading should impress upon every shipper the importance of provisions carried in the bill of lading contract, says the Weekly Letter of the Illinois Sand and Gravel Producers' Association. The injunction recently granted restraining the commission from putting the new bill of lading into effect as originally planned was obtained by non-federal control carriers, but it is believed the United States Railroad Administration will not accept the new bill of lading until the situation has been clarified. It is the duty of the carrier, however, to furnish the shipper with a bill of lading in accordance with the provisions of the Act to Regulate Commerce. The only obligation resting upon the shipper is that he must present a statement showing the character and amount of goods offered for shipment.

Quarrying Asbestos Rock

THE MOST PRODUCTIVE asbestos region in the world is in the neighborhood of Thetford Mines and Black Lake in the Province of Quebec, Canada. Though the output was somewhat curtailed through lack of export trade during the war, prices have greatly advanced and the industry has prospered. About 14 companies are now in operation in the district.

The rock is excavated almost exclusively by open-pit quarry methods, the small amount of tunneling done being chiefly for the purpose of obtaining more direct and convenient transportation lines. The rock is drilled chiefly with air-operated tripod drills, and is shot out in benches about 16 ft. deep. The larger masses thrown out by the primary shots are block holed, jackhammers being used for this purpose.

The crude fiber occurs in irregular veins scattered through the rock mass and constitutes the most valuable product. In all quarries producing crude fiber, hand loading of quarry rock is a necessity, as the crude must be sorted out by hand. A few quarries producing little or no crude employ steam-shovel methods of loading.

Most of the rock is removed from quarries by overhead cableway hoists. A recent development in rock transportation consists in the projection of inclined tunnels through which the rock is hauled on cable cars.

The crude fiber is "rough cobbled" in the quarry to remove most of the adhering rock. It is then taken to cobbing sheds where it is hammered and screened to free it of all rock impurities, and it is then shipped without milling. Rock containing fiber veins less than half an inch in width is milled to separate the fiber. Briefly, the milling process consists in crushing and hammering the rock, separating the fiber by air suction and screening and grading the product into various classes, depending on the fiber length.

There is no prospect of a shortage of fiber for all prospective needs. Present plant capacity is sufficient for normal requirements, and the industry could be readily expanded as there is evidently a very large reserve supply of asbestos-bearing rock. Core drilling has shown good fiber-bearing rock at a depth of at least 700 ft. below the surface, and it may continue to a very much greater depth. As an indication of the possibilities of development in the region, it may be noted that within the past year a new quarry has been opened in the Coleraine district about 10 miles from Thetford mines. The rock contains an exceptionally large proportion of crude and mill fiber, and the deposit is undoubtedly of large extent.—By Oliver Bowles, U. S. Bureau of Mines.

Selection and Use of Wire-Cloth Screens

Suggestions for Solving Your Screening Problems — Gauge, Mesh, Opening and Other Terms Defined—How to Order Wire Cloth

ECONOMICAL SCREENING is the greatest mill problem before any rock industry where products are sized, and the solution lies largely in the selection of the screens. The elements that enter into the solution of screen troubles are:

1. How the screen is used.
2. The type of screen.
3. The size of opening.
4. The size and kind of wire.
5. Material to be screened.
6. The capacity required.

It is necessary that data for assistance in the selection of screens be furnished, which have been decided on by the fineness of the product required, and the general conditions under which it is hoped to screen successfully, with the idea of economy and quality first in mind. These facts, brought together, will make a production cost that will enable you to operate profitably.

Of course, results are not guaranteed, but long experience and a wide range of tests enable a solution by the selection of a particular screen for a particular use. While screen troubles are not always eliminated, yet in every case they can be improved, and it is with this idea in mind that the selection of screens be given very careful consideration. The service departments of most wire-cloth manufacturers are only too ready and willing to serve and co-operate with the user in this direction.

Importance of Proper Selection

Screen troubles in production expense and production cost are big leaks, and to remedy them is the mission of the wire-cloth manufacturers. Under the old methods, the screen user had to do the experimenting in the mill, going to the expense of testing various screens until something was found that would produce the desired result; but the wire-cloth manufacturer can save much of this expense, being equipped with sections of screen covering thousands of varieties, varying in size of opening, mesh, metal, diameter of wire and material. The screen selected may not meet all the conditions in actual practice, but in the screen chosen for the work the element of sizing can be brought to a very close proximity of what may be required. Therefore, with this idea in view, the following information is given with the idea to enable the user to arrive at a satisfactory selection of screen.

It is recommended that the microm-

eter be used in determining the diameter of wire in decimals of an inch. It is absolutely accurate, and shows the exact diameter of the wire to a ten-thousandth part of an inch. The disc gauge is objectionable because it does not show fractional sizes, and in the fine sizes of wire same can easily be stretched a full size in forcing the wire in the notch. A forked gauge, unless carefully handled, can be sprung to show a variation of a full size of wire. It is good practice and we would recommend gauging the wire with a micrometer.

Definition of Mesh

Mesh in wire-cloth represents the number of openings per lineal inch. To count the number of openings to an inch, measure from the center of a wire to a point one inch distant; thus 4 mesh should count four openings from the center of a wire to the center of a wire one inch from that point. Fractional meshes are counted the same way. In specifying mesh by inches or the fractional part of an inch, state if the opening is desired "in the clear" or "center to center." For instance, $\frac{1}{4}$ -in. mesh may measure $\frac{1}{4}$ -in. from the center of one wire to the center of the next wire, or it may be $\frac{1}{4}$ -in. "in the clear" between the wires. The actual opening between the wires is technically known as "space," and should thus be clearly defined in specifying your wire cloth requirements.

In stone, sand and gravel screens, with large openings, it is customary to specify the size of openings, rather than the mesh, and state the size of rod or wire and in the finer sizes the mesh or accurate sizes of openings.

Size of Opening; or Space of Opening

The size of opening between wires determines the size of the screened product, and it represents the most important point to bear in mind when specifying wire cloth. With the size of opening determined, a screen may be selected of a mesh and diameter of wire that will produce the result desired. The size of wire should be selected with a view of the service required of the screen, for where a light wire will screen freely and be sufficient for a light material, the heavy, hard material demand-

ing the same sizing as the lighter material will require a much heavier wire to support the weight and withstand the wear.

It can readily be seen that if the screen be too light, the service of the screen will be correspondingly shortened, while a heavier wire in the same opening will be found to give much longer service. Therefore, the desired requirement naturally should be long life and durability. With this idea in mind, manufacturers of wire-cloth can make, given the same decimal opening, wide ranges of wires which will give wide ranges of stiffness and strength and durability. Of course, the point is the grade and the lightness of material to be screened.

"Double Crimped" Wire

The term "double crimped" in wire-cloth means that both the shoot and the warp wires of the wire-cloth, which represent the longitudinal and cross wires, may be crimped the same depth and thus prevent the wires from spreading. By this method of construction the screen remains intact and gives the same accurate sizing, as long as there is metal enough left in the wires to sustain the weight of the material on the screen. Each wire forms a center or support to the other, rendering both the warp and the shoot wires uniform and forming a rigid screen construction.

Ordering Wire Cloth

The question of ordering wire cloth might appeal to some as one not to be discussed, but the importance of knowing how to order can be appreciated by a manufacturer, for in placing an order for wire cloth, it is necessary to specify the number of rolls or pieces, length of each piece or roll, width, size of opening or mesh, decimal size of wire and material from which the cloth is to be made. With this information the user can be positively sure that his requirements will be met strictly to the letter. This is important for the fact that an indefinite expression or specification in an order allows sharp practices and substitution of materials which may not be apparent to the eye, but in the end reduces production and quality of product. This must be eliminated, for it is co-operation by the manufacturer with the user that gives satisfactory results and uniformity of product.

Long life of wire cloth is most desired. This requirement is being met by

the manufacturer, from time to time, by the processes of special metals, and wire fabrics can be furnished in all metals. The general product of screening has been constantly improved and added to its life by making it of metals to meet the varying conditions, with the idea of resistance in the chemical makeup of the wire.

Wear and Tear on Wire Cloth

The double crimped feature of wire cloth, as heretofore mentioned, gives a rigid construction to the whole screen. The wear is not on the inside of the opening and the screen does not wear out by the opening being enlarged by use, but rather by wearing on the surface of the rods or wire, thus the sizing is accurate so long as there is metal enough on the surface to retain the weight of the material to be sized. The diameter of the wire at the point which determines the screen sizing is protected from wear as the coarse material in going over the screen does not touch the wire at this point. If a smooth surface is required for screening, this can be obtained in the wire cloth by rolling the screen after it is woven.

Testing Sieves or Screens

The value of a screen test is little unless made with an accurate square-mesh testing sieve. A uniform, square mesh is absolutely necessary in making intelligent comparison of tests. There has long been a demand for standard testing sieves with accurately measured openings that increase or decrease through the series in a fixed ratio. Although several screen scales have been proposed from time to time, they have never found their way into common use or practice. This was on account of the difficulties of weaving the many odd sizes of mesh and wire called for in the proposals, also that the screen scales did not contain any of the sieve openings in general use.

The value of a standard to which all can work is admitted, and in establishing a standard scale, we believe something has been contributed worth while to the advancement of standardization in technical work. The Bureau of Standards of the United States Government has standardized the 200-mesh sieve made from 0.0021-in. wire, having an opening of 0.0029-in. as the base of standard screen scales. When it is necessary to carry an analysis finer than 200 mesh or coarser these sieves can be supplied from commercial stocks of wire cloth.

Wide Range of Wire Cloth

Wire cloth is manufactured to meet a most varied requirement of the industrial field today, and for all practical requirements. There is no business

into which wire cloth enters as a part of the mechanical production that cannot be served by some special weave or fabric in wire, giving economy and quality and uniformity of the production. Wire screens can be supplied of special construction, shape of opening, widths, material (including screens made of nickel, lead, aluminum, silver, bronze, copper, phosphor-bronze, special bronzes, monel metal, or any of the commercial metals now in common use).

The importance of this rests with the relative uses under varied conditions, taking into consideration materials to be screened, conditions under which screening occurs, acid and chemical reactions and hardness of materials to be screened. These conditions are all readily met by wire cloth made of spe-

cial metals, weave, or construction. The question of specifying a certain grade of material to fit into each individual case of the reader may not be possible, for the reason that a comparison of meshes for any specified use would not be practical, as the wide range of meshes and uses to meet existing requirements is an individual problem for each of us.

This article was written with the intention of illustrating capacity and uses of wire cloth and represents the part of an educational problem that the manufacturer considers necessary to his part in enlightening the screen user today. With this idea in mind, it is recommended that the reader, if he has a screening problem to contend with, carefully consider and seriously study this problem.

Income Tax Office Detects Double Sets of Books—Deputies Investigate

WASHINGTON, D. C.—With the decision in the English-O'Brien case in Boston as a precedent, the Bureau of Internal Revenue has inaugurated an intensive campaign for the detection and punishment of persons and concerns who failed to render tax returns or who evaded the payment of part or all of the taxes due the Government. No quarter will be shown, no compromises will be accepted and the prosecution of tax-evaders will be pushed to the limit, it is declared. The only persons who will receive any consideration are those who innocently filed incorrect returns or persons who attempted to evade the law who come forward with a confession and a correct report.

Within a few days the treasury department will have not less than 5,000 thoroughly trained men scouring the country for persons who have not paid their taxes or paid in full. For the first time in the history of the country, it is declared, a millionaire has been sent to jail for non-payment of taxes, and the same slogan of "without fear or favor" will be followed in the prosecution of others who may be detected in attempts to evade taxation.

Business concerns especially will be subjected to scrutiny. It appears that, as in the English-O'Brien case, certain concerns throughout the country have been keeping two sets of books—one for themselves and one for the revenue inspectors. During the past two years firms which formerly made but comparatively small profits have reaped a harvest through the war demand for the commodities in which they dealt. In such cases there has been a temptation to falsify returns, the idea being that a return can be filed showing only a moderate increase in business which, compared with

previous returns, will appear to be a straightforward report. Messrs. English and O'Brien adopted that procedure and nearly saved a million dollars in taxes.

Distribution of Government Road Machinery

WASHINGTON, D. C.—Details of the distribution of road-building and other equipment, held as surplus by the War Department, have just been furnished the Senate in a report submitted by the Acting Secretary of Agriculture. Nearly 22,000 motor trucks and automobiles have already been distributed, it was declared, as well as large quantities of other material.

In response to a request as to what material would be available for distribution, the Secretary of War stated that the War Department would deliver to the Department of Agriculture, out of the surplus in the United States or France, the following equipment, the necessity for which was estimated by the Department of Agriculture: 400 steam and gas-driven road rollers, 700 concrete mixers, 600 road graders, 400 elevating graders, 500 rock-crushing outfits complete, capacity 125 to 200 tons per day, 200 clamshell, orange-peel and bottom-dump buckets, 125 road carifiers, 50 caterpillar and drag-line excavators, 700 road and railroad plows, 160 automotive cranes, 40 portable asphalt plants, 200 steam shovels, capacity one yard or less, 6 back-filling machines, 200 screening plants, and large quantities of drags, cars and carts, rope and cable, etc.

There has also been placed at the disposal of the Secretary of Agriculture the following construction materials: 550,000 bbls. of bituminous binders, 50,000 lin. ft. prepared joint filler, 2,110,000 bags Portland cement, 1,000,000 tons of gravel, 1,000,000 tons crushed stone, 600 concrete buggies, and large quantities of fencing, metal, structural steel, etc.

"Cleaned and Screened Aggregates"

Canadian Expert Says Poor Sand Is Responsible for Most Concrete Failures—Moral: Buy Material with a Reputation; Don't Experiment

"IT IS CLAIMED that any engineer or experienced man can tell good sand at a glance. That is impossible. He may be able to tell that it is too fine, if it is very much too fine, or too dirty, if it is very much too dirty; but, beyond that, engineers or experienced men can not tell at sight whether this sand or that is good and reliable for strong and dense concrete work.

"All sand contains more or less silt or dirt. The reason for this is that it is composed of small particles of broken rock, of different sizes and compositions, coming from different parts. These particles have been washed away or transported from their different sites at different times and settled in layers of different thicknesses in what is now a workable sand bank or deposit. Therefore, there is no guarantee or even likelihood of uniformity, and one carload of sand may be first class and the next of very poor grade for concrete work.

"Also, the dirt and silt, which is very often injurious to sand for concrete purposes, are bound to be present in some parts of the sand bank; because the small particles of rock that are washed towards the bank will naturally carry with them more or less of this fine material.

Graduation of Sizes

"Besides the avoidance of injurious silt, there is the size or grading of the sand to be considered. It should be well graded, having a certain proportion retained on each sieve from say the eighty mesh to the one-quarter in. sieve. If all the sand grains are of nearly the same size, the voids will be too great, and, unless an additional amount of cement is used, the voids will not be filled. If too fine, the concrete will not be of the required strength. The reason for having sand well graded is so that the fine particles will fill the voids of the coarser particles, thus reducing them to a minimum.

"In order properly to proportion a concrete mixture, it is necessary to determine the voids; for, without this information, the engineers are working blindly and probably wastefully. Where they are figuring on having a good dense concrete for a reservoir, oil tank or foundation, the result is likely to be different and if the water goes through the wall, concrete once more gets a black eye.

Injurious Chemicals in Sand

"Another very bad fault in some sands, which can not be determined without testing, is that they contain injurious chemicals. Sometimes the drainage from some industrial plant, such as a chemical works, soap factory or tannery, though located several miles away, will contaminate a sand supply, rendering it unfit for use in making concrete. As a rule, such contamination is discovered by making 3 to 1 briquettes with the sand under consideration and also with standard sand. A comparison of the results will soon tell whether or not there are injurious chemicals present.

"Some years ago I had occasion to deal with a very interesting case of the above type. A company decided to build a concrete laundry building in Eastern Ontario on the site where an old stable had been standing for years. They tore down the old building; and, in excavating for the cellar of the new, ran across such nice looking sand that they decided to use it in the concrete mixture for the new structure. They had no end of trouble. The concrete would not set, and the walls fell in.

"In carrying out an investigation, it was found that briquettes made of this sand would crumble in the hand after seven days' setting. These briquettes were so disintegrated that they could not even be put in the machine to test. An analysis was made, and we found that the sand was saturated with ammonia which had percolated through from the horse manure.

"As a result of this investigation, the sand had to be taken away from the site of the work, the old concrete thrown out, forms rebuilt, new sand purchased, and the work reconstructed. All this delayed the work, cost money for material and labor to replace that wasted, and inconvenienced the owners. A sensible program of testing would have prevented any of this trouble.

Poor Sand Responsible for Most Concrete Failures

"I would venture to say that three-quarters of the failures in concrete are due to poor sand; and then some engineers will not hesitate to state that it is unnecessary to have sand tested.

"As far as stone is concerned, the same argument holds as in the case of sand. In order to regulate the mixing of con-

crete, the voids must be determined; and, in order to get good results, the stone must be clean, strong, well shaped, and well graded.

"It might well be stated that the best argument for the general inspection and testing of all building and structural materials is that every large corporation such as the Canadian Pacific, the Grand Trunk, the Canadian National Railways, the Montreal Tramways, the Montreal Light, Heat and Power Co., the Harbor Commissioners of Montreal, Toronto, Hamilton, London, Peterborough, the departments of the government, provinces, states, the counties and municipalities that are at all progressive, and large private concerns too numerous to mention, all have their materials thoroughly tested before using. The sooner other engineers and architects make up their minds to have testing and construction supervised by experienced men, the sooner eyesores, failures and constant repairs to concrete work will stop." —Emmanuel Mavant, concrete expert with Milton Hersey Co., Ltd., Montreal and Winnipeg, Can.

The moral Mr. Mavant did not add; but that any intelligent reader may read between the lines, and it is: "Buy your sand and stone from a reputable producer just as you buy your cement."

Concrete Car Proves Success in Severe Test by U. S. Bureau of Standards

WASHINGTON, D. C.—Experiments and tests with a reinforced concrete freight car at local yards here have shown that this type is capable of standing all the stresses to which it is likely to be put while in service. The railroad administration has been experimenting with a car of this type and has announced through its engineers that it regards the car as practical and efficient. The bureau of standards is now in possession of the car, and will try it out for resiliency and other characteristics.

The car has been put to about every test the engineers could think of. Among other things, a clam-shell steel bucket weighing two tons, was dropped on it five times from a height of 20 feet.

The car weighs 53,600 pounds, its size being about that of the ordinary railroad gondola freight car. Steel cars of the same size weigh 46,000 pounds, but it is believed that the weight of the concrete car can be reduced to not more than 48,000 pounds. The cost of construction of the new type is something like \$700 less than for a steel car and it can be produced in greater quantities.

Concrete cars are regarded as being peculiarly adapted for hauling coal, the sulphuric acid in the coal in no way corroding the concrete, although it rusts the bottoms of the steel cars.

Hints and Helps for the Plant Superintendent



Device for Taking Up Slack in Conveyor Belts

OWING to the market conditions in crushed stone last winter the Point Anne Quarries, Ltd., Point Anne, Ont., the plant was disposing of the larger sizes much faster than the small sizes.

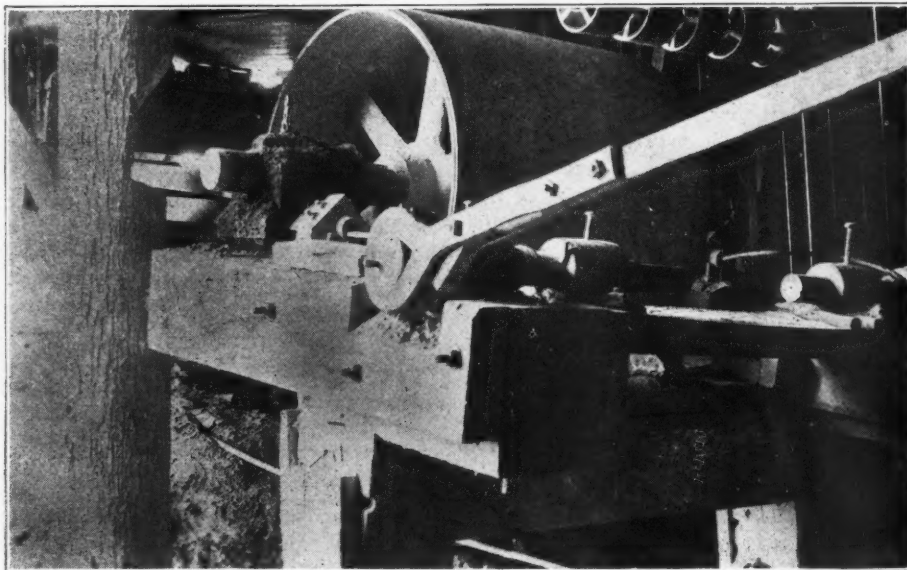
Each cable passed around a 3-in. shaft and was wound on this shaft with a ratchet, as shown in accompanying view.

By releasing the ratchet the 6 ft. of slack was obtained immediately, and when the tripper was taken out of service and it was necessary to take up the

a clam shell or locomotive crane in the way of loading-out equipment."

Keep Belts Aligned

IT IS VERY IMPORTANT for the efficient operation of belt conveyors that they be kept in decent alignment. A condition such as that shown herewith not only causes rapid wearing out of the belt but the increase in friction adds materially to the power required.



Wrench and ratchet for taking up belt slack

Consequently the small sizes, particularly the 1-in., accumulated so fast that it was necessary to remove some of it from the shipping bins to the ground storage pile, from time to time—indeed, at every possible opportunity, such as noon hour and every small breakdown.

A standard belt tripper would not work on the inclined belt from the bin outlet to the storage pile, so a special tripper was constructed which kept the belt at its regular incline up to the point where the stone dropped off. This of course meant shortening and lengthening the belt by takeups every time it was found necessary to tap the stone bins to remove the surplus of 1-in. stone.

It was found at once that the time required to operate the ordinary screw takeups would consume the greater part of the noon hour in letting out and taking up the 6 ft. of belt required to operate the tripper. So the screws were replaced by steel rope or cables, the cables leading to the back of the pulley in line with displaced takeup screws.

slack, the ratchet would take up the 6 ft. in exactly one-half minute.

This of course is a small affair when considered for one day but in the course of a year quite an appreciable amount of time is saved. Then again it allows the tapping out of quite a lot of stone where before there would hardly have been time enough to adjust the tripper with standard takeups.—A. G. Bennett, Supt., Point Anne Quarries, Ltd.

Storage Pile for Winter Business

C. G. KNOBLAUCH, supervising engineer of the sand and gravel properties of H. D. Conkey & Co., Mendota, Ill., believes in the storage pile because there is or ought to be money in it.

"Every producer," he informed a Rock PRODUCTS representative, "has calls for material in winter and the plant with a storage pile easily and usually sells 100 to 150 car loads during the shut-down period. A storage pile requires only



Belt out of alignment

Lever for Bin Gates

AT ONE OF THE PLANTS of the Janesville Sand and Gravel Co., Janesville, Wis., bent pipe levers have been rigged up so that the bin gates may be operated from the ground, as shown in the accompanying illustration. This is more convenient than a runway.



Device for operating bin gates

Special Rollers for Belt Conveyors

A SAND AND GRAVEL PLANT which handles its material from the point it comes out of the pit to the screening plant by belt conveyors is certainly entitled to the credit of having considerable experience in operating belt conveyors. Multiply the number of plants by three, each plant probably having in the neighborhood of 1,000 ft. of conveyors, and the experience is certainly worth investigating.

This is the case of the Janesville Sand & Gravel Co., Janesville, Wis., of which J. K. Jensen is president and J. R. Jensen, general superintendent. Mr. J. R. Jensen does not believe in making the trough of the belt conveyor too deep—which he contends is a common error. He has no trouble in handling dry sand and gravel on belts with no more troughing than shown in the accompanying illustration.

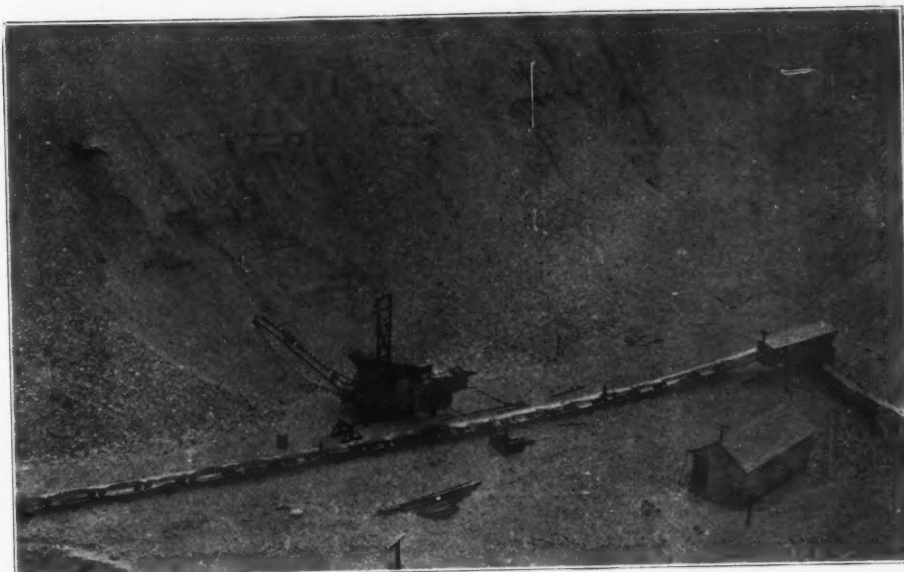
For these conveyors Mr. Jensen uses a special type of belt carrier or roller, consisting of two or three rollers of about 6 in. diameter and 6 in. face under the main part of the belt, with bevelled rollers (6 in. inside diameter and 8 in. outside diameter at the edges of the belt. These rollers are all rigidly attached to the same shaft which revolves in journal boxes at the ends, like the axle of a car wheel.

As the views show the central part of the belt rides flat, only the outside edges being slightly turned up. This, it is claimed, is instrumental in prolonging the life of the belt, in any event, Mr. Jensen's experience has demonstrated that belts with these carriers have lasted for four years, being operated summer and winter with no protection whatsoever from the weather, as the views show.

This type of carrier also has the advantage of taking care of snow and ice conditions better than the usual type of carrier. It is also easier to keep in alignment and easier to adjust to alignment than some other types of carriers.

The point has been raised that the outside of beveled roller travels farther than the inside edge, being of larger diameter, and that therefore the edges of the belt must slip, since its speed is the same as the middle rollers, or the inside edge of the beveled roller. While this may be theoretically true it has no practical significance, as the experience of these plants has proved.

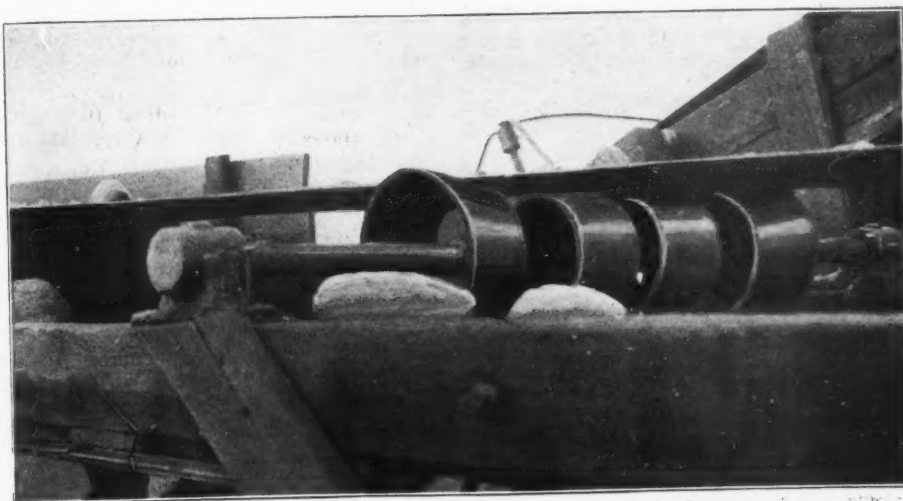
Incidentally the middle view shows a home-made but effective type of belt stretcher. It is generally conceded that bending a belt over a pulley more times than is absolutely necessary does not tend to prolong its life. The stretcher shown herewith, it will be seen, introduces but very little bending into the belt.



Janesville Sand and Gravel Co., Janesville, Wis., has use for several thousand feet of belt conveyors



Simple belt stretching device—special rolls or carriers for belt conveyors at the Janesville plant



Detail of special rolls or carriers for belt conveyor, saving much wear and tear—note flatness of belt

Railway Man's Argument for Encouraging Use of Agricultural Limestone

Agricultural Agent of the Chicago & Eastern Illinois R. R. Tells Local Agents What Increasing Use Means to the Railroad—Cooperative Handling of Material a Reality

E. S. STEPENS, AGRICULTURAL AGENT of the Chicago & Eastern Illinois R. R., whose work was referred to in *Rock Products* of March 29, p. 42, has sent out a circular letter to all the local agents of his road calling their attention to what the universal use of agricultural limestone would mean to their company. The following are extracts from this letter:

"There are 25,000 or more acres of agricultural land tributary to practically each community along C. & E. I. rails in Illinois and Indiana, within a radius of five miles from the center of town.

Building the Soil

"Much of this soil is sour, hence lacking in maximum fertility and productiveness, and which condition can be corrected by use of agricultural limestone.

"If it were possible to locate in each of C. & E. I. communities an industry which would employ 150 men and create new wealth in material or food worth half a million dollars per year (proceeds of which would be spent in such communities) it would be an achievement worthy of the best cooperative effort of bankers, merchants and grainmen with the county agricultural agents, farm advisers and farmers.

"Exactly that result can be accomplished in building up the soil adjacent to each community, because if such soil-production were increased \$20 per acre (most limestone experiments show better results than this), it would total \$500,000 per year—and no doubt mean the employment of an extra man on each 160-acre farm.

"Here is the economical soil-building recipe: Lime the land so legumes (clovers) will thrive on it. The clovers will store nitrogen IN the soil and furnish needed feed for livestock ON the soil. The nitrogen will later be converted into wheat and corn. The livestock will manure the land and pay well in so doing."

This constitutes sensible, diversified farming, and results in gradual improvement in land and land values. It is the kind of farming that brings prosperity; the kind they have practiced in Europe for centuries, and which enables farmers to operate—at a profit—land worth \$1,000 or more per acre.

Cooperation in Handling Limestone

"Fortunately there is plenty of limestone in the valleys of Illinois and Indiana—the question is to get it on the farm.

"In this the farmer needs help: He needs the active cooperation of everyone who, in turn, will benefit by his success. The limestone producers alone can't do it all. The railroads alone can't do it all.

"Ground limestone is usually a byproduct of stone-quarries getting out crushed rock. It is made as the quarry is operated and must at that time be loaded into cars and shipped or else it is wasted, i. e., dumped on the ground.

"Thus limestone dust must be shipped—not when the farmer is ready for it—but when the limestone is loaded and ready for the farmer. This means placing orders in advance. It means some method of storing limestone at destination ready to be handled by the farmer when he wants it, or when the roads are such that he can haul it.

"This result calls for cooperation: it means space or facilities at each station along the railroad should be located where limestone, as produced by the quarries, can be unloaded and stored. It means a little cooperative organization of the bankers, merchants and farmers to arrange to place orders for a few cars in advance. It means the sale of such stored limestone to the farmers by such town organization practically at cost, and that the banker and merchant will have to wait for their profit until the farmer begins to benefit by their foresight in helping him.

How Practical Cooperation Works

"At some of our stations such organizations already are operating, where the bankers order the limestone; it is stored on railroad right-of-way; our agent acts as agent for the bankers in weighing out the stone to farmers, who then go to the bank and pay cost of the stone, plus the unloading expense, and a slight addition for waste, etc.

"A carload of limestone will sweeten about ten acres of sour land. It can be seen there is no danger of an over-supply at any station, as this means sixty-four carloads to the square mile or section of land.

"The Brownell Improvement Co. and

Prairie State Fertilizer Co., with offices at Chicago, Ill., and the Charles Stone Co., office at Marion, Ill., all having quarries on C. & E. I. rails, are producers of excellent quality of agricultural limestone and are anxious to develop its use, and prepared to quote lowest possible price on same. Their big need is shipping orders in advance.

"As food won the war, so will food bring about normal peace conditions and prosperity—and as farmers, on the whole, depend a good deal upon the advice and encouragement of town bankers and merchants, the quickest way to get this limestone work under way is to start with local organizations."

Agricultural Advisers Drive Limestone Producer Out of Business

IN THEIR ENTHUSIASM to get farmers to using limestone many agricultural experts are over-reaching themselves, and if their practice of trying to beat down the price of agricultural lime and limestone continues they will end by defeating the very object of their enthusiasm. For they are driving lime and limestone out of the market entirely in some places, and it doesn't require a professional economist to prove that this method doesn't reduce prices, but as a matter of fact, by limiting competition eventually leads to an increase in prices.

A newspaper report from Ruddells, Ark., states that George Weigart, manager of the Arkansas Lime Co., has said that his ground limestone plant would be forced to shut down and the manufacture of pulverized limestone discontinued because the company is unable to make a profit. He said that the agricultural authorities have advised that agricultural limestone is worth a certain price per ton on the land. This price, Mr. Weigart said, is lower than the cost of manufacture under present conditions. The plant turned out thousands of tons before the war and it sold lime throughout Arkansas and adjoining states. Mr. Weigart believes that a majority of the lime plants have discontinued the manufacture of pulverized limestone on this account.

Nature, Origin and Properties of Sand

Definition of Sand—Mechanical Weathering and Chemical Weathering of Rocks and the Effects on the Quality of Sand Formed from Them

SAND IS USUALLY DEFINED as any unconsolidated rock material coarser than clay or silt and finer than gravel. Gravel is any aggregate of rock particles coarser than sand and finer than boulders. There are no definite lines of demarcation between clay or silt and sand, between sand and gravel, or between gravel and boulders, each so grading into the next that the coarse sand of one classification may be the fine gravel of another.

Usually material smaller than 0.1 to 0.2 of an inch in diameter is called sand rather than gravel by engineers. Other authorities use one-fourth of an inch as the dividing size between sand and gravel.

Although there is no definite or necessary chemical or mineralogical composition of sand, our usual conception of it involves a highly silicious, usually quartzose aggregate of grains; but the composition may vary through the complete range of all possible rock types. Sand differs from sandstone only in that the former is loose, the latter consolidated; consequently, there are all gradations from loose sand through friable sandstone to quartzite. And though we usually think of sandstone, like sand, as a quartzose aggregate, we sometimes have sandstones consisting largely or even wholly of substances other than quartz.

Origin of Sand

Sand consists of small particles of rock which have resulted from the breaking down or weathering of other rocks. This weathering may be the result of either mechanical or chemical processes.

MECHANICAL WEATHERING—Mechanical weathering is brought about in many ways. In temperate and cool latitudes, the work of frost in this respect is very important. Water, held in the larger openings or in the minute pores of the rock near the surface, freezes and the expansion causes the rock to crumble into small particles. In those rocks, such as the granites, which are made up of a variety of minerals, the unequal heating and expanding of the various types of mineral grains, each with its own rate of expansion, cause them to tear away from their neighboring grains, allowing the rock to fall into fine particles. This is particularly true in arid regions where the daily range of temperature is extreme. In deserts the abrasive power of wind-driven sands rapidly grinds away rock surface, forming more sand and powdering still more

SAND AND GRAVEL plant operators are going to take more interest in the tests and specifications applied to their product. A first essential is a knowledge of the nature, origin and properties of sand and gravel. This article is the first of a series on this subject which will be published in *ROCK PRODUCTS*. This series is based on a very complete treatise on the subject just received from the Missouri Bureau of Geology and Mines, entitled "The Sand and Gravel Resources of Missouri," by C. L. Dake.

finely the blown particles. The abrasive effect of sand and pebbles on river beds and on each other, as well as the rasping of glaciers over their beds, also causes the grinding up of much rock material both from the beds and from the transported load. Waves, too, tend to grind up rocks, and the wedging power of growing roots is a considerable factor in the mechanical breaking up of solid rock into sand or gravel.

The most important characteristic of this mechanical weathering is that it yields a product chemically much like the parent rock from which it is derived. It is simply the same rock in finer particles. Granites and other igneous rocks weather mechanically to sand of the same chemical composition as the rocks themselves; sandstone simply breaks down to sand; limestone on account of its solubility does not usually reduce to sand; and shales and slates weather back to clay particles too fine in grain to be called sand. Not all the minerals of any given rock, however, are of equal hardness; consequently the continual wearing by wind, water, or ice grinds the softer minerals faster and finer than the hard. The finer the particles, the more easily they are removed by wind or running water. The result of this is a segregation of the harder minerals; and as quartz is the hardest of the abundant rock-forming minerals, there is a tendency for the segregation of quartz sands, even by mechanical weathering.

CHEMICAL WEATHERING—It is rare, indeed, however, to find any weathering-product resulting from mechanical processes alone. With the exception of quartz, clay (chiefly kaolin), the iron

oxides (limonite and hematite), and limestone (calcite and dolomite) most of the commoner rock substances are changed by the chemical activity of the atmosphere or ground water; that is, by uniting with certain elements from the air or water, they change their chemical composition and become different minerals. Some of these new minerals are soluble and are carried away in solution to lakes or the sea; some are insoluble and are left behind as residual products or are removed more slowly by mechanical means.

When an igneous rock, such as a granite, weathers chemically, the soluble minerals which are formed are carried away, the insoluble remain behind in the form of clay and quartz sand mixed with iron oxide and many minor constituents. These are intimately mingled, constituting a sandy clay or a clayey sand, depending on whether the sand or the clay is in excess; but as the clay is in a more finely divided state than the quartz sand, it is more easily carried away by wind or water.

Thus chemical weathering like mechanical, only to a much greater degree, segregates quartz sand; and as igneous rocks vary greatly in the amount of quartz they contain, it follows that those highest in quartz (acidic rocks like granite) yield the largest amount of sand, those with little or no quartz (basic rocks such as gabbro) yield the smallest amount, while some rocks yield no sand whatever. Since the feldspar weathers readily and the quartz very slowly, the farther the sand is carried along the streams, and the more it is worked over, the more of the feldspar weathers out and the higher the percentage of quartz left in the sand.

Because metamorphic rocks usually are not very different in chemical composition from the rocks from which they are derived, they will not differ materially from them in their weathering, except that they usually weather more slowly.

Sedimentary rocks, themselves the consolidated products of former weathering, are already more or less completely assorted, depending upon the conditions under which they were formed. The more completely chemical weathering had proceeded in the first production of these sediments, the less change will it produce on the present rock mass. A sandstone containing still unweathered fragments of the original rock will be

weathered chemically to a purer quartz sand than it was formerly, and a sandstone with a considerable admixture of clay will be more completely assorted upon weathering. Pure quartz sandstone, therefore, weathers to a pure quartz sand, an impure sandstone to a purer sand than it was before. A limestone, if pure, completely dissolves; if impure, the limestone itself is removed in solution, leaving the chief impurities, chert, sand, and clay as residuals. The clay being finer in grain than the sand or chert will be carried away more rapidly by wind, running water, or waves, thus again tending to segregate the quartz. In like manner, the finer clay of an im-

pure shale will be carried off, leaving behind the purer quartz sand.

Thus it will be seen that the whole process of weathering and erosion is a selective one in which there is constant tendency to produce more and more thoroughly assorted sediments, the clays and silts being carried away, the purer quartz sands being left behind. These more or less theoretical conditions are presented as throwing light on certain principles of sand distribution. It may be stated as a general rule that the more times a series of formations have been worked over by weatherings and erosion, the more thoroughly they become assorted.

If, then, a series of sands rests directly upon a series of old crystalline rocks from which they have been derived, they may usually be expected to contain more unweathered constituents of the original rock than if they had been transported far, or worked over several times. Similarly, by the process of selective transportation, the deltas of great slow-flowing rivers are made up of very fine silts, the lower stretches are full of rather fine sands, while in the upper reaches and along many of the tributaries, the sands are often coarse, grading up into gravels.

(To be continued)

Ideal Track Layout for Gravel Plant

How One of Indiana's Largest Gravel Producers Handles a Large Number of Cars With Minimum Switching

QUANTITY plus quality of gravel produced in a minimum of time and at a minimum cost per cu. yd., is the aim of the keen gravel producer of today. Since three of these four very desirable items may be favorably affected by the track layout of a plant, that subject is worthy of due consideration.

The accompanying yard layout of the Western Indiana Sand and Gravel Co. is cited as approaching very near the ideal. This plant, which is one of the subsidiaries of the Greenville Gravel Co., is managed by M. A. Neville and is located due south of W. La Fayette, Indiana, on the south side of the L. E. & W. R. R.

The outstanding features of this layout are that it is truly a gravity yard; it has sufficient storage for cars both empty and loaded; it enables three cars to be loaded at one time; and all cars can be handled within the yard by a 20-ton locomotive.

The empty cars are delivered to the plant at the upper end of the yard or

upon the sidings provided by the C. C. & St. L. R. R., and the L. E. & W. R. R. (Since the natural slope of the ground is from west to east, the west yard will be referred to as the upper yard and the east yard as the lower yard. See the profile of the yard accompanying.)

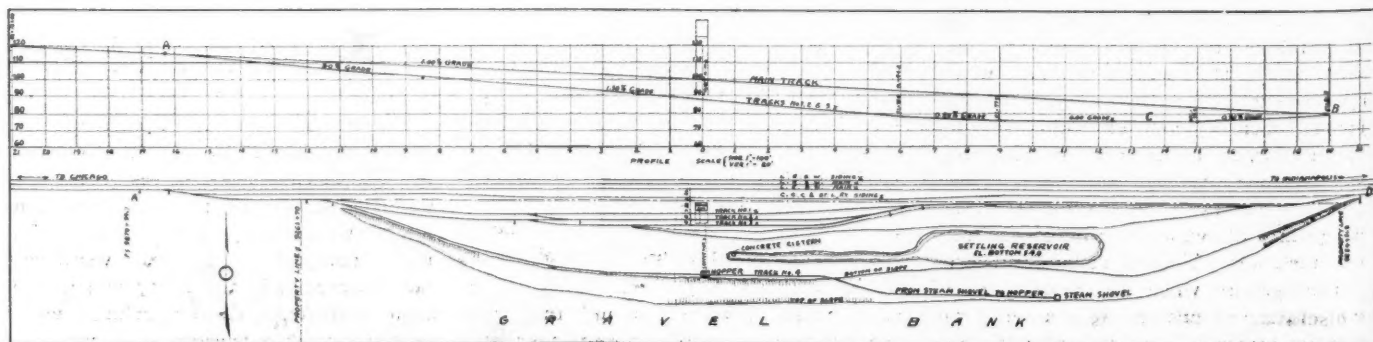
If the cars are out on the siding, suitable switching is provided so that the dinky may run up out of the pit while the steam shovel is loading, and pull them into the yard. Once in the upper yard a 2 per cent grade carries the cars down to the loading tracks (Tracks No. 1, No. 2 and No. 3 in the plan of the diagram).

The $1\frac{1}{2}$ per cent grade of the loading tracks is sufficient to further move them down to the screening house or loading chutes. Here they are quickly and evenly loaded by being slowly moved along under the chutes as the material flows into the cars. After they have been loaded, the cars are carried down

into the lower yard where the grade tapers off to 0.50 per cent, and then to 0.0 per cent grade. This part of the yard is called the loaded car storage. Here, by careful planning and foresight, the engineer who laid out the yard was able to take advantage of the natural grade of the main line tracks.

In order to simplify the explanation of this feature, it will be well to refer to the diagram in the following manner. The point where the empty cars enter the upper yard from the main tracks will be called point A and the point where the loaded cars leave the lower yard will be called point B. Now, due to the natural grade of the main tracks, point A has an elevation of 36 ft. above point B.

By using the minimum grade on the yard tracks that will satisfactorily move the cars, the lowest elevation of the track yards (at point C of profile) is but 3 ft. below point B. This 3 ft. rise is overcome by a 0.90 per cent grade, thus eliminating the usual steep grade and



Track layout of the Indiana Sand & Gravel Co. pit at La Fayette, Ind., showing profile of tracks, main lines, sidings, car storage space and switch lines

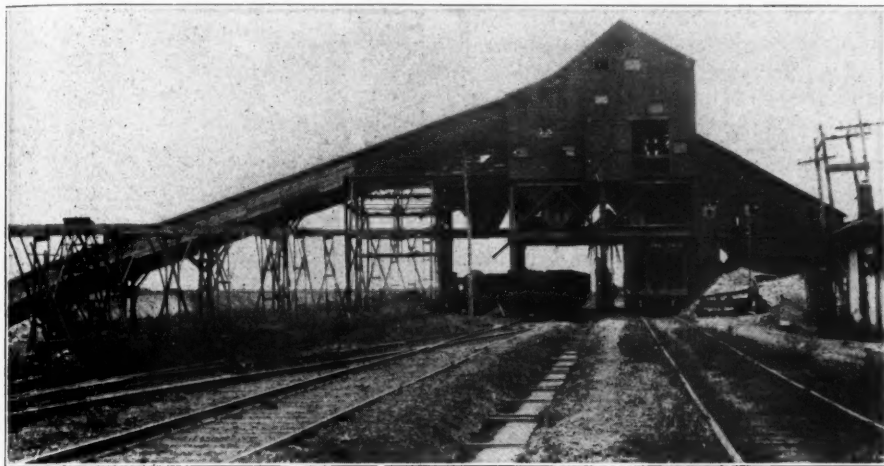
hard pull out of the pit and making it so that, if necessary, the dinkey can easily put the loaded cars out on the sidings.

At first this may not seem such a decided advantage, but when it is taken into consideration that if the plant locomotive can do all yard duties, the cost of switching is eliminated. And in this case the slight grade enables the work to be done with an unusually light locomotive.

Gravel plant power units at best are very inefficient and a locomotive is possibly one of the most inefficient. And so, by reducing the size of the locomotive

is working in the eastern end of the pit and at a level of about 25 ft. below the conveyor hopper. Such conditions necessitate the pull from the shovel to be made up a steep grade and around a rather sharp curve at the same time. This combination of grade and curve considerably increases the tractive effort of the dinkey. During damp weather when the tracks are slippery the small dinkey has considerable difficulty in pulling three average sized cars up to the hopper.

A heavy rail section is used—being about a 90-lb. section—and the standard



Three tracks enable three cars to be loaded at the same time

there is a correspondingly large reduction in fuel consumption.

The upper yard, used for empty car storage and the lower yard, used for loaded car storage, each have more than 2600 ft. of track, and in addition to this there is a siding of over 3500 ft. which may be utilized; thus providing ample storage for all times. This plant has handled as high as 72 cars in a 10-hour day. In order to accomplish such a day's work it is obvious that cars and material would have to be handled quickly.

Speed is obtained by the use of three loading tracks. In the accompanying cut the operation of loading three cars at one time is shown. The loading is done directly under the screening house; the material coming directly from the screening chutes to small loading hoppers. Since these hoppers have practically no storage capacity in comparison with the output of the plant, all material must be loaded at the time it is washed and screened.

The only objectional feature to the yard layout is in the haul from the steam shovel to the unloading hopper at the belt conveyor. However, since this track is being shifted constantly, the best of conditions cannot be obtained at all times. At the present time, the steam shovel (bucket capacity of $2\frac{1}{4}$ sq. yds.)

ties are bedded in gravel ballast. Drainage of the waste water at the loading chutes is provided for by a trough which is made of boards. (See cut.)

While such a track layout represents a greater investment than a less complete one, the increased initial cost is compensated by a reduction in overhead expense and operation cost. The resulting saving will more than pay interest and depreciation on capital invested, according to the experience of this plant.

Joint River and Rail Rates Will Effect Great Savings

ST. LOUIS, MO.—The long sought combination of rail and river freight rates between St. Louis and points to the south along the Mississippi River and to inland territories which will enable shippers and consignees of rock products, especially sand, limestone and cement gravel, to effect great savings in the cost of haulage of their products from Ohio, Illinois, Oklahoma and other states will be established if 13 proposed rate schedules filed a few weeks ago in the railroad administration office at Washington are granted.

The consequence of the establishment of such rates would be the extension of trade territory to points from which the industries of St. Louis are barred solely because of the high haulage costs.

The Mississippi River Barge Line, which is operated under the direction of the Railroad Administration now serves points to the north of St. Louis along the river and for miles inland. This, in the opinion of St. Louis shippers, shows discrimination against merchants in the southwest and for this reason they request the establishment of joint rate schedules to interior points in the south as well as to the north.

Heretofore shippers in Minnesota, Iowa, northern Missouri, Illinois and Wisconsin have had the privilege of shipping products to St. Louis by rail and then having their shipments transferred to the barges for shipment south, at a joint river and rail rate schedule, at the same saving of 20 per cent as accrue to St. Louis shippers. The new schedule would enlarge this territory to include North and South Dakota, Ohio, Michigan, Kansas and eastern Nebraska. One tendency of the new rates will be the diversion of trade through St. Louis and New Orleans instead of through Chicago.

Institution of joint rail and water rates, it is expected will work to capacity the new fleet of tow boats and steel barges now under construction and which will be completed soon. The capacity of the new fleet will be 1,000,000 tons yearly.

The rates from St. Louis to Texas include a tariff on a route by river to New Orleans, thence into southern Texas, and one by river to Vicksburg and thence into northern Texas. The tariff from St. Louis to Texas by way of Vicksburg will effect a saving of $22\frac{1}{2}$ cts. per 100 lbs. to St. Louis shippers of rock products. The present rate is \$1.84 and the new rate is \$1.61½ for the same class.

Similar savings will be effected for St. Louis shippers into southeastern states. One of the schedules provides for joint river and rail rates from St. Louis, northern Missouri, eastern Kansas and Nebraska, Iowa, Minnesota, Wisconsin and Illinois into the northern half of Florida, Chattanooga, Vicksburg, Memphis, Mississippi, Alabama and Georgia.

Phosphate Deposits in the South Pacific

EXTENSIVE phosphate deposits on Nauru or Pleasant Island and Ocean Island, located about midway between the Marshall and Solomon Islands, northwest of New Zealand, are said to be the most valuable deposits of the kind in the world, says the New Zealand Dairyman. The islands, of coral formation, have for ages been the rookeries of sea birds, which have deposited guano that has impregnated the limestone, forming phosphate rock 40 feet in depth. The quantity of phosphates available is estimated at 500,000,000 tons, and as fertilizer it is said to rival the famous nitrate fields of Chili.

Annual Summer Meeting of Ohio Sand and Gravel Producers Association

E. Guy Sutton, of the National Association, Outlines Some of Its Coming Activities—
Co-ordinating Work of State and National Organizations



Guy C. Baker, Executive Secretary

THE SECOND ANNUAL CONVENTION of the Ohio Sand and Gravel Producers Association was held at Cedar Point, Ohio, July 22, 23 and 24. Considering that the convention was held at the busiest time of the year for plant operators, the attendance was representative and good.

The most important matters considered by the convention were railway rates, the new Ohio road law and association activities. There seems to be a general impression that railway rates will be raised again within a short time, and ways and means of combating any increase in sand and gravel rates are uppermost in the minds of all operators.

It is probable that a determined fight will be made to have the 10 cents per ton reduction now being applied on material used in public works made permanent and extended to include private work as well. The sand and gravel producers will undoubtedly be able to prove that even the present rates are depriving the railways of income by curtailing traffic in sand and gravel, while any increase in rates would not only be fatal to such

traffic, but to many sand and gravel operators as well.

The convention was favored with an address on "The Concrete Road," by C. S. McKee, of the Portland Cement Association, Pittsburgh office, and with one by E. Guy Sutton, secretary of the National and the Indiana Associations of Sand and Gravel Producers. Extracts from Mr. Sutton's address follow:

Some Benefits of an Association

You have had a very efficient working organization in Ohio for the past two years, and it is therefore needless for me to dwell on the advantages that may be gained through sincere, honest and intelligent co-operation among men and firms engaged in like pursuits of trade. But without knowing exactly what benefits you have derived because of your close relationship, I can predict that you have made these discoveries that are worth while.

You have discovered that there are some mighty fine fellows engaged in the production of sand and gravel.

You have found to your satisfaction that it is quite a different matter to come in competition with the individuals composing a firm, than it is to consider the firm as an abstract proposition.

One is personal and the other impersonal. One is a "being," something with life and aspirations; the other a "thing" without heart or soul.

Your business dealings have been placed on a higher plane and thus you have given the industry not only a better standing in the community, but you have increased your own self-respect and made your chosen work a pleasure instead of a source of dissatisfaction. You have found that business should be controlled by a higher consideration than mere money-making.

The foregoing discoveries, which I know you have made, are largely ethical in their nature, but the social relationship which you have established has lead no doubt to more practical and profitable results, when gauged by a remunerative standard.

By exchange of ideas you have been able to enhance your product and at the same time lower your costs.

By the exchange of materials it has been possible to give better service to your customers, to the benefit of the community at large. "Service" is becoming more and more the watchword of good business.

You have realized that uncontrolled competition has too often been the death of trade rather than its life; that by selling below cost, or often at less than your competitor, you have not increased the total sales in your territory; but that interests outside of your industry



E. Guy Sutton

made a profit out of your "lack of foresight."

Now, assuming that the points of advantage gained by co-operation, which I have mentioned, are correct, and they are unless your experience has been vastly different from that of other organizations, should it not be your desire to extend the good that may be accomplished to other districts? This is not by any means wholly an altruistic view of the matter, as the statement might at first lead you to believe. For you have found that the benefits derived through your efforts are confined to a comparatively small radius, determined by the distance you may reach before encountering competition from States where the new order of things is not in force. You cannot carry the advantages of your state association merely to the state line, for there you will encounter overlapping territory and possibly poor conditions of competition.

It is apparent that there must be some larger organization whose function it will be to co-ordinate the work of the State Associations and avoid duplication of effort and expense by assuming the responsibility in all matters that are not purely of a local character.

Work of the National Association

Mr. Sutton prefaced his remarks on the proposed activities of the National Association of Sand and Gravel Pro-

ducers by sketch of the development of the sand and gravel industry. He then said:

In comparison with the production of other aggregates, the operation of a sand and gravel plant seems simple and inexpensive, so that the prevailing practice of the new producer until recently, was to base his selling prices largely on the misrepresentations of the purchaser and on false assumptions as to cost.

While the producer realized, no doubt, at the beginning of his operations that the question of freight rates and transportation facilities were important elements to be considered in connection with the sale of sand and gravel, yet it was quite natural for him to conclude that the railroad officials, as a matter of business expediency, would see to it that competitive rates and adequate facilities were provided for producers on their respective lines for all time to come.

Regarding uses of sand and gravel, Mr. Sutton stated that hitherto specifications for these materials as concrete aggregate had been shaped by experience with crushed stone, which was an entirely different material as to voids, shape of particles and inherent qualities. He believed that sand and gravel operators had been lax in promoting new types of road wherein sand and gravel were used; and in creating a demand for sand and gravel other than those already established by allied and competing industries. The matter of championing the cause of gravel in concrete fire tests was also discussed.

Other matters for action by the National Association, Mr. Sutton said, were uniform cost accounting, settlement of freight rate problems and employers' liability insurance. The rate for liability insurance, Mr. Sutton said, was higher than in industries of far greater hazard.

Scheme of Organization

Mr. Sutton said:

It should be the chief purpose of any trade association to reach and benefit the individual producer, who in turn, in order to secure the best results, must be in intimate touch with the producers operating in his particular territory, thus forming natural competitive groups that go to make up state associations. Now it is further recognized that there are certain districts composed of a varying number of states, or parts of states where the character of the deposits, the conditions of operation and transportation, and the problems in general affecting the industry, are similar.

The plan, therefore, will be to build up a national association, starting with the smaller unit as follows: (1) Individual producers; (2) Competitive groups within states (state associations); Regional divisions (8 or 10 in number); National association.

By having an organization of this kind, it is apparent without further discussion that the activities of the National Association can be correlated and interwoven with the work of the smaller units, so as to prove most effective and, in the long run, least expensive.

There are many matters of common

interest to the producers within a state which can be best handled by the combination of the competitive groups comprising the state associations. Similarly there are questions and problems of greater magnitude and of vital concern to all producers throughout the United States that can be given attention most effectively and economically by the National Association, some of which are: (1) Transportation; (2) Extension of the use of sand and gravel; (3) Co-operation with national government agencies; (4) Co-operation with other national trade and professional associations; (5) Industrial relations; (6) Gathering statistics of the industry; (7) Legislation affecting the industry; (8) Cost accounting; (9) Insurance; (10) Publicity.

Must Catch the Spirit of the Times

Mr. Sutton continued:

The foregoing are merely suggestions of what may be undertaken by the National Association. But in my opinion the wisdom of being prepared to meet by a united effort the unforeseen conditions that will constantly be presented during the transition period of our national life, that is, the time of changing from the old to the new order of things brought about by the war, is of greater importance than special activities for which definite plans may be laid.

Then, too, the tendency is toward closer relationship in all lines of business. The brotherhood of men engaged in like pursuits is not only in keeping with the spirit of the times as exemplified by the proposed League of Nations, but it is furthermore the part of good

judgment as a business proposition. The manufacturers from whom you make your purchases; the engineers who write the specifications for construction work for which you sell your material; the contractors who use your materials; the labor you employ; the owners, security holders and officials of the railroads that transport your products; the insurance companies that write your insurance, and I might continue indefinitely—all are nationally organized.

In the face of such a network of organized industries, is it not plain that the sand and gravel producers must unite for the development and protection of their interests?

Then in addition to the trade associations with which we must deal and in many cases co-operate, there are as previously mentioned, a number of organizations composed of allied industries, the representation being principally through national associations. Whatever we may think as to the desirability of such combinations of interests yet since they exist, can we afford as sand and gravel producers to stand aloof and have no part in determining policies that may vitally affect our interests?

The national association has every reason to exist and exert its influence. It has a mission and a field that is only limited by the amount of assistance it receives, both financially and morally, from the producers which it represents.

The Ohio producers have, from the beginning, given liberally of their time and money for the welfare of the National Association. So have the more progressive producers in other states.

Sand and Gravel Association Secretaries

Decide to Boom National Association and Put More Pep Into All Their Work

TO GET BETTER ACQUAINTED, exchange ideas and map out some plans for future activities, the secretaries of the Indiana, Michigan, Wisconsin, Nebraska and Illinois Associations of Sand and Gravel Producers met in Chicago, July 23. There were present Messrs. Stone and Luker of Illinois, Sutton and Yeoman of Indiana, Porter of Michigan, Hubbard of Wisconsin and Walsh of Nebraska.

One of the principal topics discussed was gradation or sizing of materials looking to some uniform standard. R. C. Yeoman, engineer of the Indiana and National Associations, is already working on this subject through a series of tests of sand and gravel concrete aggregates, now being conducted at Purdue University. As a result of these tests it is expected to develop specifications for sand and gravel aggregates for concrete—the first such specifications probably ever drawn by, or with the co-operation of the sand and gravel producers themselves; all previous specifications having originated with the users and not the producers of the materials.

To further the matter of standard gra-

dation or sizing of sand and gravel each state association secretary promised to use his every endeavor to have his association appoint a committee on uniform gradation.

In the matter of carrying on association work the secretaries seemed to agree unanimously that the one big feature most necessary to successful accomplishment was good fellowship. In other words, if the members can be made to have confidence in one another and become friends, there is small chance of their cutting one another's "business throats," so to speak. With state associations this ought to be possible of accomplishment.

The meeting had gratifying results to the secretary of the National Association because of the enthusiasm of the state secretaries in giving support to the national organization. Mr. Sutton, of the National Association, outlined his plans and hopes and desires somewhat as they are given on another page of this issue in the account of the Ohio producers' meeting. In return Mr. Sutton was assured of the active support of the state associations.

Promotion of Lime in Competition With Limestone in Agriculture

Extracts from Report of Henry M. Camp of the Eastern Agricultural Bureau of the Lime Association—Puts Great Emphasis on Field Demonstrations

THE SEVERAL YEARS OF EXPERIENCE of lime producers interested in co-operative undertaking for the promotion of agricultural lime in the East, has proven to their satisfaction that this class of work must be conducted on the regional or sectional plan, if effective service is to be given and beneficial results are to be derived. By this, I mean that in the successful promotion of the use of an agricultural requirement, such as lime, for improving the yielding power of the soil, intensive study must be applied to general farming conditions, problems of competition, transportation facilities, and other vital factors, local in their nature, as existing in the territory in which the effort is being made for the increase of sales.

In taking this position, which is believed to be a practical one, as it relates to the work of the Eastern Agricultural Bureau, I do not mean to imply that the spirit of centralization and co-ordination is not to prevail, in so far as the establishment and operation of district bureaus of this Association is concerned. The principles and policies of a fundamental nature to govern and provide for the national standing of the Association, are to be recognized, respected, and complied with by all district bodies conducting a work peculiar to the interests of the producers of their respective operating territories.

Under this plan of organization and function, the Eastern Agricultural Bureau, in the interest of devoting itself to the business welfare of the lime producing companies to which it is directly responsible in the increasing of demand, has mapped out a working territory which embraces all of the selling territories of member companies designating, wholly or in part, for agricultural lime, and operating within the borders of this district. It is endeavoring by this arrangement, to do a thorough work—one which it is confident will not only be resultful in better agricultural demand, but will serve as a contributory force to our greater ambition, namely, to see the general consumption point of lime well maintained above the line of production, which means market stability and more regularity to the income of our companies in the form of reasonable profits.

MR. CAMP looks upon pulverized limestone rather as a competitor than as an ally of burnt and hydrated lime in agriculture. His energies in the East have been devoted exclusively to promoting lime; for his contention is that lime plants are designed to produce lime, and that his job is to promote lime by every means available.

Our bureau is an educational one, both to the lime producer and to the user of our products in agriculture. In tackling the scientific end of our work, our scientists first investigated the various doctrines of soil liming, as advocated and practiced by the agricultural colleges of our working territory, particularly with reference to the economic use of the different liming materials in their relation to the cost of a pound of oxides applied to the soil. We found that very little complete investigation of this character had been made by our official agricultural institutions, as it related to the availability or solubility of the various forms of liming products, and the problem before us seemed to be a big one.

By the end of the first year and a half of our work, we had under way a number of projects of an important fundamental nature, together with other achievements, several of which I will outline as follows:

1. In our own laboratory, we made a devoted study to the action of lime in rendering more soluble and therefore available, natural potash and other plant foods in the soil, to the growing crop.
2. The development of greater activity on the part of the Bureau of Soils, Department of Agriculture, to the study of the chemistry of soil liming.
3. An increase in the appropriation of the Bureau of Soils, Department of Agriculture, for the conduct of its liming project.
4. Development of the theory, now the recognized practice, of the practical advantage in the use of finely pulverized limestone in place of the coarse ten-mesh material, screenings, and other by-products of crushed stone plants. (Dr. Langenbeck, the Bureau's Chemist, gave earnest devotion to this project for over a year and a half, in his work with soil chemists and other scientists of the State Colleges.
5. Study of the comparative costs of

high grade burned limes and ground and pulverized limestones, ground oyster shell, and marl, delivered at the farm, on the basis of the availability of oxides of lime and magnesia as contained in each of these forms of liming material.

6. Study of the lime hunger of soils, as shown to exist by the standard lime requirement test.

7. Co-ordination of effort with the National Fertilizer Association, resulting in an orderly and effective relationship for the development of the interests of our respective industries.

8. Intensive study and research and dissemination of press news matter, bulletins, etc., on the vital necessity of the maintenance of a plentiful supply of organic matter in the soil as a basis for the more general use of lime.

9. Study of statistics by States of the Bureau's working territory, in order to ascertain the average amount of lime used annually per acre in soil treatment, which was shown to be 40 lb.

Field Demonstration Work

The Bureau regards the plan of establishing popular field demonstrations with the use of all forms of liming material at privately owned farms, the owner of the farm acting as the demonstrator, one of the most valuable projects that it has yet engaged in, provided such work can be laid out under the official direction of the director of extension and departments of soil management, or farm demonstrations of our state colleges. We have found no trouble in effecting this arrangement, and our first effort in this work was that which was launched in the spring of 1918, when we were successful in establishing about 110 tests on farms of New York State, New Jersey, Pennsylvania, Maryland and West Virginia.

In the spring of 1919, upon extension of our working territory to cover the New England States, we concluded that one of the best ways in which to introduce the Bureau and its educational work in this new territory, would be to enlist the interest of its State colleges, in permitting us to take part in their extension programs as they involved the practical demonstration of the effects of soil liming. In this way, we were also successful in locating 97 field experiments in 36 counties of the states of Connecticut, Massachusetts, New Hampshire, and Maine, each test consisting of the official liming project of the college, and under the general supervision of the

directors of extension and the personal direction of the various county agents and the extension workers assigned to the project. Some 253 tons of liming material were furnished without any cost to the farmers acting as demonstrators by member companies.

The general plans for conducting the experiments were decided upon through conference with the representative of our Bureau and the extension officials and heads of the departments of soil and farm management of the colleges. Initial records of each test have been compiled and it is very interesting to observe from an educational standpoint, the variety of crops, methods of rotation and forms and amounts of material employed in the demonstrations, all of which should result in the availability of much data of a very valuable nature to our purpose.

The commercial benefits to be derived from this co-operative work are summarized as follows:

1. The Bureau effects a substantial and productive relationship with the State College from the start.

2. It further commands the respect and moral support of the College in the desire to educate its member companies to better selling practice for agricultural lime, and in this connection, to co-operate in behalf of the more unified doctrine for soil liming, as shown to be proper from the results of practical farming demonstration.

3. Under the extension programs of the County Farm Bureaus, farmers' meetings are held throughout the winter months, when discussions take place on all demonstrational work engaged in by each Bureau. Our lime work and the results therefrom, will receive consideration at these meetings, and no doubt a good deal of commercial value will accrue to us in the more general use of our products in soil improvement.

4. A large number of the County Farm Bureaus publish a monthly magazine or bulletin and include regularly therein, descriptions of all demonstrational work performed by them. The full facts of our liming experiments will be published, and this, as you can readily see, embodies a class of publicity that is of the greatest value to us, because it is official in its nature.

5. One of the biggest assets of the agricultural lime industry, is to obtain the good will and active interest on the part of county agricultural agents, in the regular use of lime in crop rotation. If we show the disposition to co-operate along proper lines with these field agricultural teachers, we will profit thereby. Experience has shown this to be a fact.

6. For the next three years, during the periods of the crop rotations involved in our field experiments, the State Colleges supervising them will furnish us, as results are forthcoming, data of a character most useful and advantageous in our publicity work. We will be able to refer to the advice on the use of lime as disclosed by the results of our demonstrations, as that of an official agricultural institution, which will be regarded by agricultural editors with that degree of interest as to enable us to

obtain a wide free circulation of it through the medium of the rural press.

The field demonstration project is one that is exceedingly sound and worthy of all of the energy and expense involved in the cost of operating it. We have an abundance of information from the scientific and popular publications of the Department of Agriculture and our State Colleges on the use of lime in agriculture, which, as a rule, while very useful to our scientists and trained agriculturists, it is not always presented in the form easily digested by the average farmer. Our aim is to prepare all advice on the use of lime in the treatment of soils, in a manner whereby the farmer will readily understand the distinct value of lime, from the standpoint of more profitable returns from his crops. There is no better way to do this, in our judgment, than to be able to point out the practical benefits from soil liming, as shown by the results of the every-day field experiment. A visual appreciation of the actual effects from the use of lime, will usually bring the order.

New General Manager of Kelley Island Co.



G. J. WHEELAN
Manager of Operations, Kelley Island
Lime and Transport Co.

G. J. WHEELAN, former general superintendent of the Marblehead and White Rock plants of the Kelley Island Lime and Transport Co., has been made Manager of Operations, succeeding F. A. Jones, who resigned July 1 to become general manager of the limestone department of the Columbia Chemical Co., Zanesville, Ohio.

Mr. Wheelan will be remembered by the members of the Lime Association who took part in the excursion to the Kelley Island plants during the 1918 convention at Cleveland.

Lime and Fertilizer

AT THE RECENT convention of the National Fertilizer Association at New London, Conn., a report was asked on the conference of fertilizer sales managers, held at Cornell University, June 9 to 14. Lime men will remember this occasion as the one at which Prof. E. O. Fippin, now head of the agricultural bureau of the Lime Association, presented the paper, published in ROCK PRODUCTS June 21, on the "Relation of Lime to Fertilizer Use."

In reporting the conference proceedings to the fertilizer convention, J. S. Coale said:

The Importance of Lime

"Another question which was brought properly to our attention was the important use of lime in co-operation with the use of fertilizer. This point has not been brought out strongly enough in the past by fertilizer men in their selling points. We were favored with an address and demonstration by Professor Fippin, of the Agricultural College, who was just about to accept a position with the Lime Association, somewhat similar to that occupied by Professor Haskell, in the Fertilizer Association. He felt that the time we had spent in Cornell was of especial value to him in view of his future work with the Lime Association. He is thoroughly impressed with the fact that the lime people have got to talk fertilizers in selling their lime, and that the fertilizer people should talk lime in selling their fertilizers, that the best results may be obtained for their customers. I believe that this point should be brought home very forcibly to all of our salesmen and that every salesman should be in a position to make a test of the acidity of any soil for his customers."

Would Use Domestic Potash to Force Foreign Competition

L. B. JACKSON, director of the bureau of markets of the state agricultural department, has, according to the Atlanta (Georgia) Constitution, written a letter to M. M. Parker, attorney for the United States Potash Producers' Association, at Washington, taking issue with the position that the farmers should pay the costs.

Mr. Jackson further believes that in event the government decides that this industry is due financial help or future protection, it should be considered as a war measure and industry, such aid should come from government funds.

Mr. Jackson also states that now that France has regained the Alsatian deposits there is bound to be a competition between France and Germany and that the government should see to it that our domestic supply is used to force this competition.

Unique Source of Agricultural Lime

Pure Calcium Carbonate Precipitated from Natural Spring Water

ABOUT 1½ miles south of Yellow Springs, Ohio, Morton R. Grinnell has what is probably the most unique agricultural lime plant in the world. A spring on his farm bubbles forth a stream of water so saturated with calcium carbonate or limestone that a good share of this material in solution is precipitated out on exposure to the atmosphere.

A deposit of this precipitated limestone—probably of many thousands of years' accumulation—adjoins the present location of the spring, and from this deposit Mr. Grinnell has built up a small

but select business in agricultural lime. He can claim without fear of refutation from any one who has ever seen his deposit that his agricultural lime is 99.9 per cent water soluble, and that therefore "it is as quick to act as burned lime, without containing any of the caustic properties of burned lime."

Mr. Grinnell writes: "We do not dry the sediment before pulverizing, but we can not grind for a day or two after a heavy rain, and the dryer it is the faster it grinds. We use a hammer mill and formerly we cut the chunks of sediment up into small pieces with axes, but now

it is all run through a small jaw crusher."

Water power is used to run the mill, crusher and elevator. About three times as much material is handled as could be of hard limestone with the same equipment.

The hill from which the sediment is taken is 30 ft. high from the level of the road shown in the accompanying view to level of the river. When dry it is of about the consistency of sand, and really does not need to be pulverized because of its ready solubility in water.

Some exceedingly interesting geological formations are found in this deposit, of which one showing a fossilized sprig of moss or grass is shown herewith.

Clamshell As Source of Lime Under Experiment

WASHINGTON, D. C.—New uses for waste clamshell originating in the button factories of Moline, Ohio, are being sought by the Bureau of Standards.

Thousands of tons of shell are thrown out by the button factories annually, more than half of the shell purchased by the factories, under present methods of manufacture, being waste. This shell, now, is used chiefly for chicken grits, for which it is sold at a very low price.

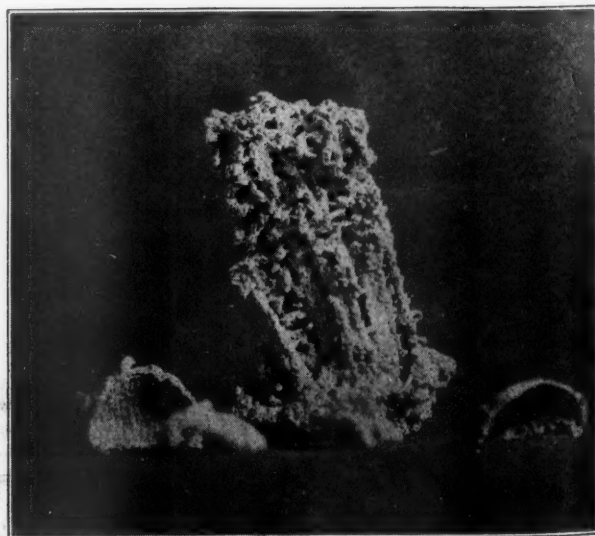
The high content of pure lime—ranging, it is declared, from 90 to 95 per cent—leads to the belief on the part of officials of the Bureau of Standards, that other uses may be found for this shell, and the investigations will cover methods of turning the shell into lime and then of ascertaining the purposes for which such lime is best suited. It is hoped to develop a lime which will fill needs not now fully met by other limes, and so to benefit both the lime and button industries.



Plant for pulverizing and shipping pulverized carbonate



Spring of water impregnated with calcium carbonate



Sample of precipitated calcium carbonate

Portland Cement Production in France

More Than One-Half of All Cement Produced in France Comes from the Marseille District

THE CEMENT EMPLOYED in the Marseille district of France is gray and slowly hardening Portland cement. This district produced before the war 600,000 tons of this material, which constituted one-half of the total production of all kinds of cement in France. The leading cement plants are at Desvres, Dannes and Neufchatel. The present annual output of the region is approximately the same as before the war. The gray cement is produced by adding the necessary quantity of clay of carbonate of lime to marl. The rapidly hardening cement is not produced in this district, but comes from Grenoble in southeastern France, which supplies natural Portland in large quantities.

The present selling price (February 1919) of the gray cement manufactured in this district is 135 francs per ton on the cars or at the plant. This price does not include the sacks or barrels which must be paid separately, and the price of which is reimbursed on their return to the plant.

Under normal conditions France exports annually 300,000 tons of cement to its colonies and imports a negligible quantity. Local cement dealers state that for the time being there is little or no market for cement, owing to lack of transportation facilities. It is probable that with the accumulation of stocks due to the continuing output and the lack of shipping facilities the locally produced cement will be sufficient to meet the needs of this section.

Quantities of Cement Exported from Marseilles

The Portland cement used in the Marseille district is entirely of domestic production, chiefly local. Prior to the war the annual output of the factories in Marseille and immediate vicinity averaged over 200,000 metric tons, and exports through the port of Marseille about 160,000 tons. These exports were destined chiefly to the French North African colonies, Spain and Argentina. In 1913, which was the last normal year, the shipments of cement from Marseille amounted to 183,605 metric tons, distributed as follows:

Exports to	Cement —Metric Tons—	Cement tiles
Algeria	60,870	695
Spain	27,479	36
Argentina	22,125	36
Tunis	14,095	295
Morocco	11,778	1,160
Turkey	8,553	467
Italy	5,281	467
Other countries	28,911	1,860
Total	179,092	4,513

The local exports of hydraulic lime during 1913 amounted to 109,875 metric tons. According to figures obtained from the Marseille Chamber of Commerce, the cement exports from Marseille during 1918 fell off to only 16,236 metric tons. The shipments to Algeria are not included in this return. There was an enormous decrease in the industrial production during the war, but since the signing of the armistice with the Central Powers there has been a gradual resumption of activity which is expected to be shortly in a position to supply the local demand.

Export Prices

One of the leading Marseille firms has given the following prices as of February 7, 1919, per metric ton, delivered quay Marseille, and put up in barrels of 200 kilos each:

	Francs	Normal Exchange Dollars
Artificial Portland cement	125	\$24.12
Natural Portland cement	135	26.05
Valentine cement	120	23.16
Roquefort cement	115	22.19

Kansas Cement Industry Under Fire

State Brings Suit on Charge of Price-Fixing

OUTER SUITS against seven cement companies of Kansas have been filed in the State Supreme Court by the attorney general of the state. According to announcements, the suits follow extensive investigations made by the attorney general's office, based on charges that the cement companies have formed a trust, in violation of state laws, to fix cement prices. The petition prays that charters, franchises and business rights of the seven companies be forfeited, that restraining orders against continuing their combination be issued, that the property of all the companies be placed under the control of the court, that receivers be appointed, and finally that each company be fined not less than \$100 for each day it has violated the anti-trust law.

The petition charges that the cement companies bound themselves not to sell, manufacture, dispose of or transport cement below a common standard figure which is termed excessive; that the companies have entered into a secret agreement to sell cement in Kansas at a uniform price, and add to said price and charge to the purchaser an amount equal to the railroad freight charges, not from

The quotations are somewhat higher for the same product delivered in barrels of 100 kilos each. It is believed that these prices will decline slightly in the near future.

Output of Cement in St.-Etienne District

There are four concerns in this conular district producing gray or white Portland cement. La Societe J. & A. Pavin de la Farge, with offices at Viviers. Ardeche, has an annual output of about 400,000 tons, and sells in this region approximately 40,000 tons. La Societe des Ciments de la Porte de France at Grenoble, Isere, which markets about 25,000 tons locally, produces annually some 200,000 tons. La Societe Vicat also at Grenoble, sells from 15,000 to 20,000 tons in this region but its total output is not known. Then there is La Societe des Ciments et Chaux de Joze, Puy de Dome, statistics of whose productions are also unavailable. There are no manufacturers of cement blocks, as this kind of material is made by the contractors themselves according to the specifications of each particular building enterprise. Two or three small firms make concrete floor tiles, mosaics and artificial marble.

the point of production to the point of delivery, but from the City of Iola, Kan., to the place of delivery, and that the companies agreed unlawfully to divide the territory of Kansas among themselves, to the end that in certain portions of the state certain companies have the exclusive right to fix the price of cement.

Includes Practically All

The suit is filed in the name of the state of Kansas against the following companies: Ash Grove Lime & Portland Cement Co., Bonner Portland Cement Co., Fredonia Portland Cement Co., Great Western Portland Cement Co., Lehigh Portland Cement Co., Monarch Cement Co., Western States Portland Cement Co. These companies comprise practically the entire cement industry in Kansas.

The cheapest price, it is alleged, that the cement companies have charged for cement is \$1.85, f. o. b. plant. One company produces its product for \$1.42 a barrel, according to findings of the state investigators.

A decision of the federal trade commission recommending the standardizing of costs in the various industries, is held by the cement companies as the cause of any similarity in prices.

Practice in Preparation of Phosphate Rock

Washing, Drying and Grinding Processes

WHILE IN FLORIDA a few weeks ago the writer had an opportunity to visit some of the phosphate rock plants. As there are different methods of preparing phosphate rock for market, this opportunity is taken to describe briefly such of the present practice as is of interest to readers of *ROCK PRODUCTS*. Methods of quarrying and mining phosphate rock were described in the October 9, 1918, issue of this magazine. Assuming therefore, that the reader is familiar with the methods of digging phosphate, this description will begin with the delivery of the material to the washer.

Florida Hard Rock Phosphate

In the Florida hard rock field, where dipper dredges on barges laid on piles, the rock is hauled to the top of the mill by cableways and spilled onto a grizzly made of rails laid about 6 in. apart. Here a man with a "gun" plays a stream of water on the load as dumped, breaking up the lumps and washing the small material through the grizzly. Two men with sledges break up the larger and harder lumps.

The oversize hard rock is thrown into a chute at one side and goes to a jaw crusher, and thence with the material which passed the grizzly, all enters the lower end of a log washer. A log washer is a wooden trough 20 to 30 ft. long containing two or four revolving wooden cylinders or logs, each about 18 in. in diameter, and arranged parallel in pairs.

By R. W. Stone
United States Geological Survey

Each log has bolted to it many iron blades about 6 in. long which are set with their long axis vertical to the axis of the log and short axis at an angle of 45 deg. to the long axis of the log. The blades of each log pass between the blades on the opposite log. The logs rotate in opposite directions, and the adjustment of the blades moves the rock along the trough in one direction.

These washers are inclined at a low angle, a tilt of about 1 in 12, and a stream of water plays into the upper end. The rotation of the logs moves the rock from the lower to the upper end of the trough and the water flowing in the opposite direction carries the fine material out the lower end and conveys it through a trough to the waste heap.

The material discharged from the upper end of the washer falls into a rotary cylindrical screen where it receives further washing by jets of water from perforated pipes playing on the outside of the screen. This screen is about 12 ft. long and 3 ft. in diameter, and consists of two cylinders, one inside of the other. The perforations of this screen are slits rather than circular openings. The slits of the inner screen are $1\frac{1}{2}$ in. by $\frac{3}{8}$ in., and of the outer screen $\frac{1}{8}$ by $\frac{1}{16}$ of an inch.

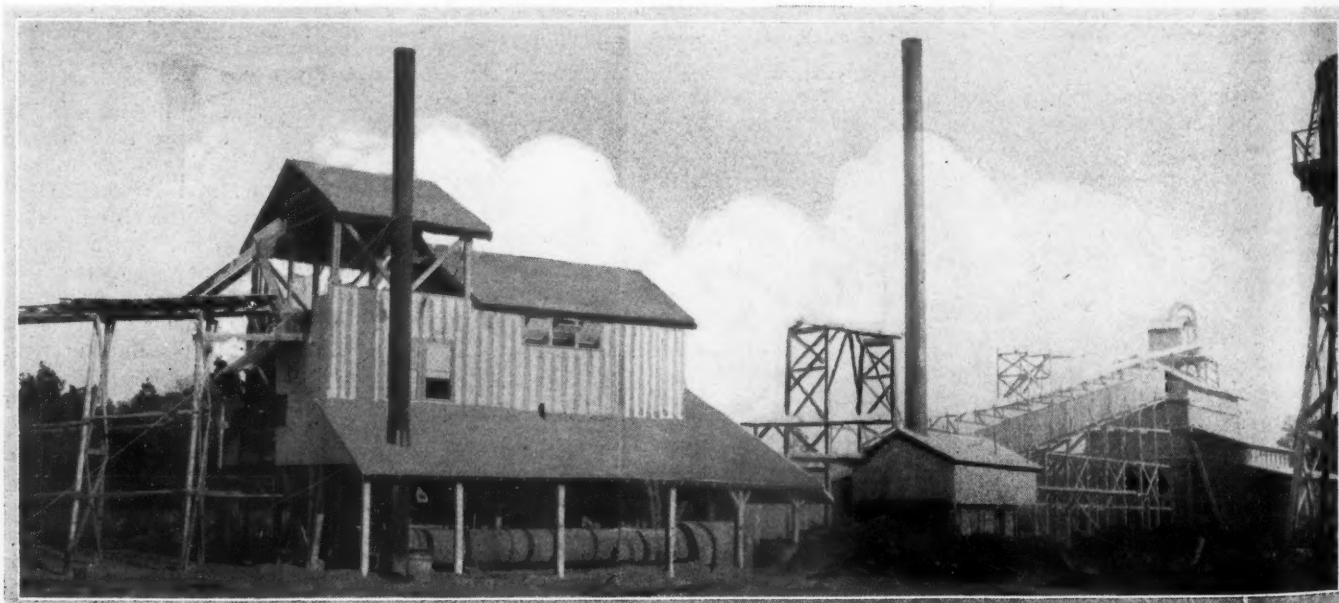
"Hand-Picked" Material

Passage through the screen removes the sand and clay still adhering to the rock. The wash water is carried through a trough to the waste heap. The oversize from the outer cylinder falls into the "wet" bin and the oversize from the inner cylinder falls upon a revolving circular wooden table. Men and women who stand about this moving table, which is about 10 ft. in diameter, pick out the fragments of limestone and flint, and balls of clay that are mixed with the phosphate. To the novice it is difficult to distinguish the good rock from the waste but the colored laborers are skilled in the ready recognition of valueless material and make a clean separation. Under the spout which discharges onto the table there is a scraper which at the end of a revolution scrapes off the phosphate remaining on the table so that it falls into the "wet" bin below.

The "wet" bin has a hopper bottom and trap so that the washed and cleaned phosphate is readily discharged into a small car running on a track, by which it is conveyed to the dry shed.

Drying Out Phosphate Rock

This shed has a wide hip roof supported on upright wooden posts, and open sides. The floor is brick and may be at ground level or elevated to the level of a freight car door. On this floor billets of wood are piled crisscross with several inches between the billets.



Soft phosphate drying plant near Ocala, Fla. Shows rotary cylindrical dryer at left with bucket elevator to pulverizer; pipe carrying pulverized, air-separated phosphate to top of stock house at right; boiler house in center

and phosphate rock is dumped on top of the wood to a depth of 10 ft. or more. The wood is set on fire, burns slowly, and thoroughly dries the phosphate. When cool it is ready for shipment to the fertilizer plant. It is reported that rotary driers are used at some mines but the writer saw none in the hard rock field near Dunnellon. This same method of drying is in use near Charleston, S. C.

Pebble Phosphate Processes

In the Florida land pebble field, the rock is washed in much the same manner. At a plant visited near Bartow, the pebble raised from the pit by electric driven pumps is forced through a 10-in. pipe to the top of the washer where it runs over a screen about 15 ft. long and 5 ft. wide, and slightly inclined. This screen is perforated with small slits through which the sand, clay and soft phosphate are washed and go to the waste flume. The pebble passes over the screen and enters a revolving tubular separator with 1-in. perforations. This separator, which is about 8 ft. long and 4 ft. in diameter, removes clay balls. The pebble then goes to a log washer 18 ft. long, which is inclined so that the rock passing through it moves up grade against a stream of water. From the log washer the material enters a double rotary screen about 4 ft. in diameter and 12 ft. long where it is washed and sorted.

The over-size from the inner jacket goes to a crusher, and thence to a second log washer. The fine material which passes through the screen also goes to this second log washer and thence to a second cylindrical screen and washer. This completes the cleaning process, there being no picking table as for the coarser material in the hard rock field.

The over-size from this last screen is crushed before being raised by a bucket elevator with the other washed gravel to storage bins.

This washer was operating 24 hours, 2 shifts of 12 hours, 5 men to a shift. Only 2 men are needed, the others being held for use in case of trouble.

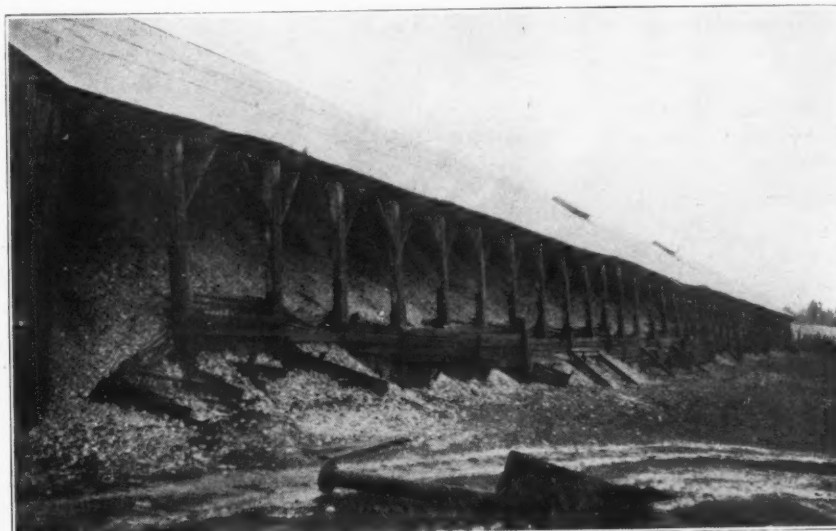
At other plants the feed pipe may discharge directly into a rotary screen, from which the discharge is onto a flat sloping screen.

Plant Required

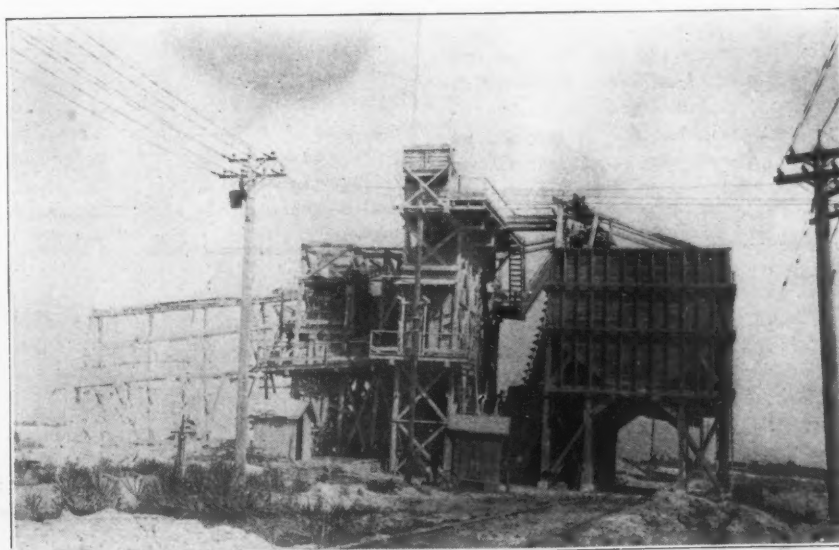
Some of the larger companies have a washer at each pit but only one drying plant. A washer is a wooden structure without roof and not difficult to take down and rebuild elsewhere as a pit is enlarged or worked out. A drying plant in the pebble field, however, is a permanent building with machinery costly to install. A drying plant near Mulberry which the writer visited is a



Hard rock phosphate mining near Dunnellon, Fla.; dipper dredge, and mine car running on trestle to washer on bank; roof of drying shed seen through trestle



Drying shed in hard rock phosphate field, Florida



Washing plant in pebble phosphate field near Bartow, Fla.; washer is shown in center, storage bin at right, and waste flume at left

poured concrete structure 40 ft. or more high and 300 ft. long.

Washed pebble is brought to the plant in small cars hauled by electric locomotive, and dumped on grizzlies between the rails at the end of one side of the plant. There are places for four cars to dump at once and four bucket elevators outside of the building carry the gravel to the top of the building and dump it inside. Here it is discharged into bins which feed eight cylindrical oil-fired rotary driers of small size.

The dry gravel discharged at the lower ends is raised by bucket elevator, one for each drier and carried to dry storage bins, also of poured concrete. The bins have hopper bottoms with chutes for loading railroad box cars which run underneath the bins.

The increasing use of raw phosphate on the soil has resulted in the mining of soft phosphate for this purpose as well as the increased production of finely pulverized hard rock or pebble phosphate. In the pebble phosphate field I saw Raymond mills being installed for pulverizing phosphate for direct application to the soil.

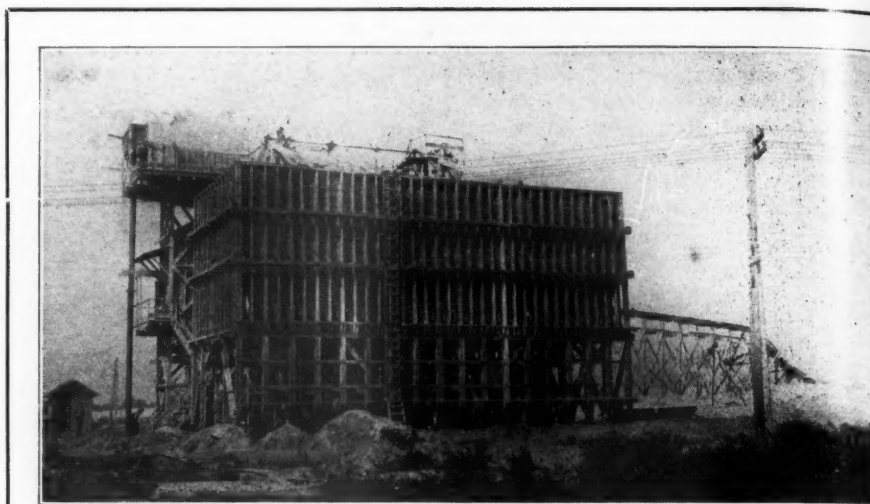
Preparation of Soft Phosphate

Soft phosphate is a clayey substance forming a large part of the matrix of the hard rock phosphate, and mixed with sand and clay in the pebble phosphate deposits. At the pits which I visited soft phosphate is dug by hand and shoveled either into a bucket swung on a cable and trolley, or onto a car on an incline track, and sent to the mill in small mine cars. Soft phosphate is not mined in wet weather because it gets too gummy.

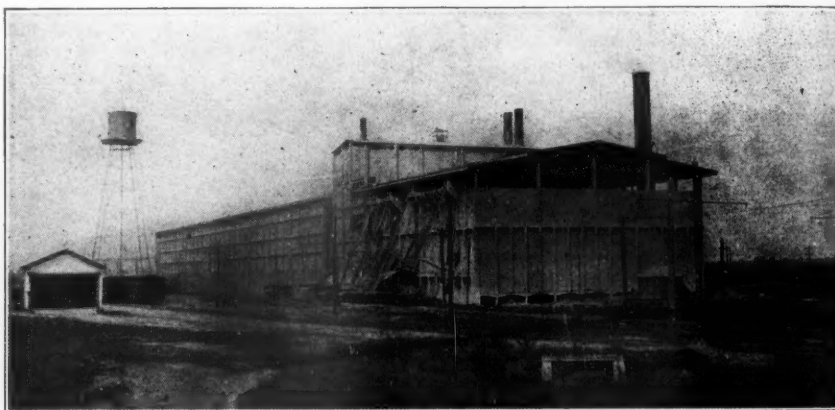
The material delivered to the mill is emptied into a hopper which feeds a roller mill. This mill is more of a disintegrator than crusher. It then goes to a wood-fired rotary cylindrical drier. The dry phosphate is then elevated and at one mill ground in Griffin mills which reduce it to about 100 mesh. At another plant it is ground in a Gardner hammer mill, and the finest material is blown out by the Raymond system and carried through a metal tube to the top of the stock house. The coarse material from the hammer mill is elevated to the hopper of a vertical burr mill. The finished ground soft phosphate falls from this burr mill into a car which is hauled by cable to the top of the stock house where it is dumped into storage. It is then ready for sacking and shipment to the consumer.

Tennessee Phosphate Fields

In the Tennessee phosphate field the method of washing is practically the same as with Florida hard rock. Drying is done to some extent in rotary kilns much like cement kilns. The dry-



Washing plant near Bartow, Fla. Shows storage bin in foreground, and 10-in. pipe discharging gravel to top of washer at left



Pebble phosphate; drying plant near Mulberry, Fla.; poured concrete structure; four bucket elevators in foreground; dryers under high roof; storage bins beyond

ers commonly used are about 5 ft. in diameter and 40 ft. long. An increasing quantity of Tennessee rock is being fine ground for direct use as fertilizer.

The dry rock is put through a coarse crusher and then goes to a fine grinding mill of the Fuller-Lehigh or Raymond type, that is, a tight metal case inclosing rollers suspended on spider arms rigidly attached to a vertical shaft. The speed of the machine regulates the pressure the cast-iron rollers exert on the grinding surface, which is a steel bull ring. The finely ground material is separated by a fan which carries off the lightest material, and the over-size is reground. Tube mills may be used also to complete the fine grinding.

Future of Raw Rock Phosphate

Rock phosphate ground and sold raw for direct application to the soil, so far as actually reported, but figures for which probably are incomplete, increased from about 40,000 tons in 1914 to 76,000 tons in 1917. In addition to this, it is estimated that 10,000 tons of soft phos-

phate are sold annually for this same purpose.

The use of both raw ground phosphate and limestone as fertilizer is making rapid advancement, a fact which should be of interest not only to manufacturers of pulverizing machinery but also to farmers, dealers in other kinds of fertilizers, teachers of farming methods, and the public in general.

New Export Freight Rates

WASHINGTON, D. C.—A new schedule of rates of freight on various commodities from North Atlantic ports to Liverpool, Manchester, Hull, Avonmouth, Bristol, Cardiff, Glasgow, Leith, Belfast and Dublin has just been announced by the United States Shipping Board through the Emergency Fleet Corporation.

The new rate on builders' cement, in bags and barrels, is \$1 per hundred pounds. Commodities not enumerated take a rate of \$1 per 100 pounds, or 50 cents per cubic foot, ship's option.



NEW MACHINERY EQUIPMENT



A New Departure in Gyratory Crushers

THE NEW LINE of "Bulldog" crushers recently put on the market by the Traylor Engineering & Manufacturing Co. contains some radical departures from previous jaw crusher designs.

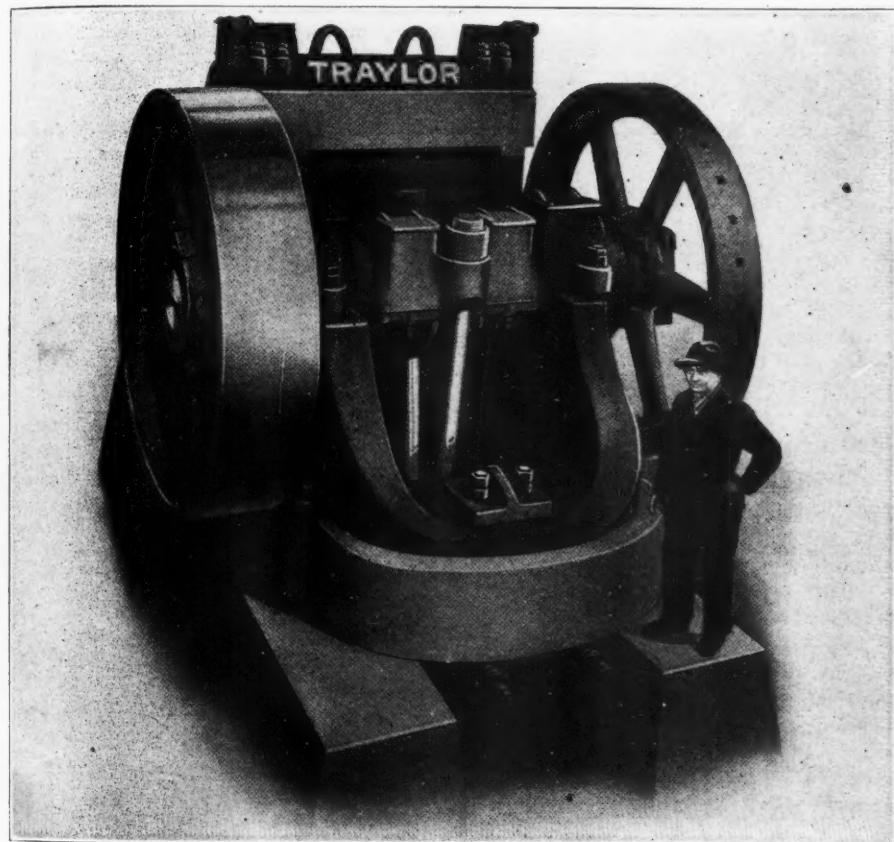
The chief feature, as is shown in the accompanying cuts, is the pitman and

to the required position when the crusher is working.

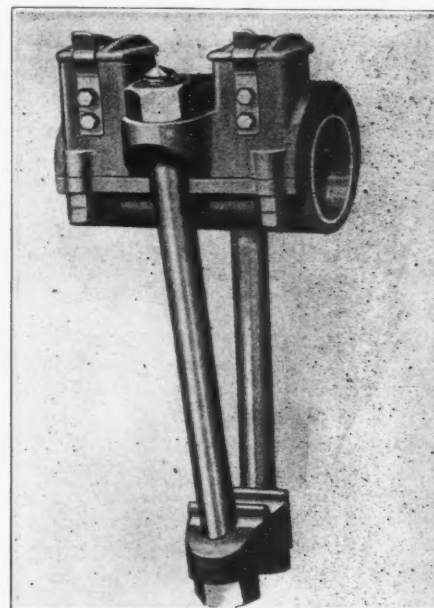
The pitman rocker for supporting the inner end of the front toggle is a semi-steel casting having sockets on the under side for receiving the lower pitman rod nuts. The top on which rests the inner end of the front toggle is so designed that the toggle rolls on the seat provided for it. The pitman block, being sup-

ported only at the middle by the spherical pitman rod nuts working in sockets, is left free to align itself with the front toggle, no matter what position this toggle may assume, it is claimed.

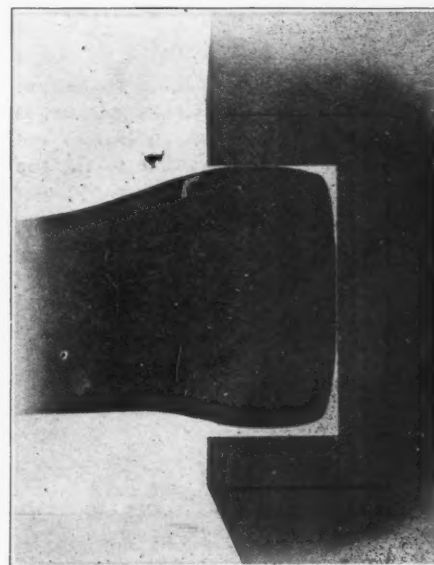
Another special feature is the toggle ends and seats, which in the Blake type crusher are cylindrical or spherical, while in the new design the toggle ends have flat seats, as shown in the detail. The new design is claimed to make better lubrication possible and to provide a joint of much less friction, as well as being self-aligning.



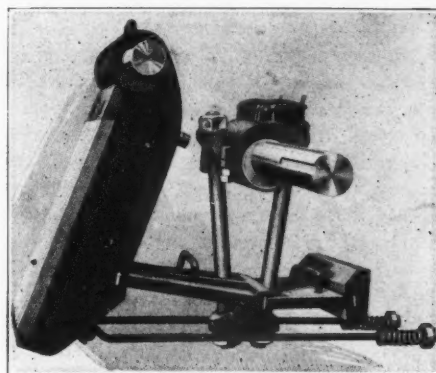
New gyratory crusher with steel-rod pitman



Pitman Details of Crusher



Toggle ends and seats



Toggle mechanism of new jaw crusher

toggle system. The pitman, instead of being made of heavy steel castings, as in older crushers of the Blake type, is made of an annealed cast steel, water-jacketed cap, to which is bolted a light semi-circular bottom section for retaining the lubricant around the pitman shaft.

Suspended from lugs cast integral with and on either side of the pitman cap, are two forged steel rods. These rods are fitted at both ends with large hexagonal nuts, having spherical bases, which fit in sockets in the pitman cap lugs, and in the pitman rocker at the lower ends of the pitman rods. This construction leaves the rods free to adjust themselves

General News From The Rock Products Markets

How Soon Will Freight Rates Go Up?

DESPITE THE CONTINUANCE of the monthly deficit record of the Railroad Administration, Director General Hines says it is still too early to determine whether the industries of the country must carry another increase in freight rates. He declares that it is impossible completely to segregate the figures of the various railroads in a way that will reveal just how much deficit it attributed to an actual decrease in the usual volume of business and how much is due to the disparity between the increase in rates and the increases in the costs of labor and supplies.

Commissioner E. E. Clark of the Interstate Commerce Commission, who testified before the House Committee on Interstate Commerce concerning the railroad problem, had no doubts about the future. He said another raise in freight rates was imperative whether the roads remained under government control or were turned back to their private owners. He did not believe that wages would be reduced, nor did he think that the economies which might result from private control would be enough to save the country from higher rates.

The May figures show that the operating expenses in May increased 24.5 per cent over those of May, 1918. Rates were approximately 25 per cent higher. The operating revenues, however, increased only 9.8 per cent. The total traffic as expressed in ton-miles and passenger-miles has fallen off approximately 12 per cent. The falling off in freight traffic alone amounted to 13.5 per cent.

Check Over Your Power Bills—Maybe You Are Entitled to a Refund

A MEMBER of the Illinois Sand & Gravel Producers' Association recently reported that he was able to obtain a refund of a considerable amount paid for power as the result of a careful check of bills as rendered against discount provisions in the power company's schedule of rates. The discounts are important, particularly the special discounts allowed on all bills when the plant is not operated between the hours of 4 p. m. and 8 p. m. during the months of November, December, January and February.

Like most other industries, during the past year the power companies have employed inexperienced help and a great many errors have no doubt been made on that account. Monthly bills for service should be carefully checked.

Indiana's Comprehensive Road System Being Planned

INDIANAPOLIS, IND.—L. H. Wright, director of the State Highway Commission, has completed a tentative outline of the roads in Indiana which will be proposed as part of the state highway system. The comprehensive plan, which spreads over the state like a spider web and reaches every county seat and city of 5,000 or more population, contains 3,006 miles.

Mr. Wright said it was probable that the road system would be adopted by January. The law requires that from the date that the state takes over the roads they shall be maintained by the State Highway Commission.

The great system of highways would, if laid out in a straight line, extend about one-eighth of the distance around the globe. It includes the "back bone system" designated by the old highway commission. This system included the Range Line road from Indianapolis to South Bend, the National road from state line to state line, east and west, the Indianapolis and Louisville road, the Lincoln Highway and the French Lick trail, and the road through the state from Vincennes to Lawrenceburg.

New Quarry Plant To Be the Largest in New Jersey

THE Delaware River Quarry & Construction Co., according to newspaper report, has commenced the erection of a new stone crushing plant at Lambertville, which when finished will be the largest plant of its kind in the State. Very large crushers will be installed which will reduce the blasting in the quarries to a minimum so far as noise or jar are concerned. Mr. Hughes, a former engineer on the Panama canal, is in charge of the operation. It is expected that fully one hundred additional men will be employed.

Ten Dollar a Day Marble Workers at St. Louis

THE STRIKE in St. Louis of members of Local No. 16 of the International Marble Workers is now in its third week and no settlement is in sight. Two hundred and fifty workers are out, the entire strength of the union.

The men are asking a wage scale of from \$57 to \$62 a week and an eight-hour day. Formerly they worked ten hours and got from \$35 to \$40. Companies affected by the strike are the Brabury Marble Company, the Pickle Marble Company, Shaw Marble Company, White and Jennett Marble Company, Margaret Marble Co., and St. Louis Marble and Tile Co., all of St. Louis.

Construction Bureau of the Lime Association Shows Results

GENERAL MANAGER HALL of the Lime Association, reports that his field men in the construction bureau have promoted the use of lime in approximately \$500,000,000 worth of construction projects, resulting in the specifying of about 100,000 tons of lime, which probably would not otherwise have been disposed of.

Republican Leaders Predict Higher Freight Rates

WASHINGTON, D. C.—Higher freight rates for cement, sand, gravel and other commodities are considered inevitable by leaders of the Republican party who have made a study of the question in connection with proposed legislation returning the railroads to private control. In a statement just made by Jonathan Bourne, Jr., president of the Republican Publicity Association, increased rates are declared to be absolutely necessary to enable the railroads to restore their former equipment.

"From facts already developed in the study of the problem of the re-establishment of our transportation systems under private management," he said, "it is clearly evident that the people of America must make up in one form or another the depreciation in railroad equipment suffered in the past few years because of inadequate railroad revenue. Upon an efficient transportation system the prosperity of every other industry and enterprise depends. The short-sighted and unbusinesslike policy of railroad regulation by one Federal and 48 State regulatory bodies resulted in what has been appropriately called starvation of the roads—a condition that must be corrected by the adoption of a constructive unified supervision.

"Notwithstanding the increase of 25 per cent in freight rates and approximately 50 per cent in passenger rates, ordered by the Railroad Administration, effective June 25, 1918, there is a deficit to the government under its guarantee, up to and including May of this year, amounting to \$451,000,000. It is thus evident that there must be another increase in rates, and the public can not have much hope of any reduction in these rates until the depreciation of the physical properties which has occurred in the past thirteen years has been made good. The experience of the past few years has doubtless convinced the public that the greatest essential to the prosperity of the country is an efficient transportation system.

General News From The Rock Products Markets

Chicago Sand and Gravel Men Organize, Adopt Policy and Elect Executives

THE CHICAGO SAND AND GRAVEL PRODUCERS' ASSOCIATION was formally organized at the Hotel La Salle, July 15 by 13 of the 17 producing companies in the district. A general policy along lines similar to that of the Wisconsin Mineral Aggregates Association (but excluding crushed stone) was adopted and officers were elected. All gravel producers are expected to become members within a short time. About 20 pits are represented in the membership.

Ben Stone, director of the Illinois Sand and Gravel Producers' Association, who had much to do with bringing together the Chicago producers, will act as Executive Secretary. Instead of the usual staff of officers, an Executive Committee of four will direct the affairs of the association; the chairmanship, rotating among the members of the committee. Each member will act as chairman for two months. This plan is similar to the old Chicago association plan.

One of the first executive actions was a decision to act in harmony with the building contractors' lockout, according to B. H. Atwood. Shipments of sand and gravel will be made for paving and sidewalks only.

Cost accounting being of such importance, a committee was appointed to study that feature of the business and to report within three months.

The Executive Committee is composed of the following: R. P. Duffy, Richardson Sand Co.; A. Y. Reed, A. Y. Reed Sand & Gravel Co.; Peter Longwell, American Sand & Gravel Co.; Frank E. Lane, Janesville Sand & Gravel Co. Mr. Duffy is the present chairman.

Mr. Duffy stated that the object of the association is to work out the problems of the industry, and especially to study and to act on freight rate matters and costs. "We shall hold weekly meetings, but I think daily meetings for a while would be better," says Mr. Duffy.

The code of ethics of the Wisconsin Mineral Aggregates Association, which organization the Chicago association is said to favor, fixes for its membership certain standards of quality, service and sales methods; approves systems of cost accounting, open prices, discounts, contract making and credits, and deals with excess tonnage matters and co-operation. (See ROCK PRODUCTS, April 26, page 22.)

Mineral Aggregates Not in Intrastate Rate Case Before I. C. C.

THE INTERSTATE COMMERCE COMMISSION, which is hearing the complaint of Indiana shippers in regard to the Illinois classifications in Chicago, at the beginning of the session ten days ago eliminated the subjects of crushed stone, sand and gravel. Originally the Central Freight Committee heard the complaints, but under direction of Director General Hines dropped the matter two months ago.

The Truth About Potash

WASHINGTON, D. C.—Calling attention to the many mis-statements which have appeared in various papers and articles regarding potash, and appealing for his assistance in enacting legislation protecting the potash industry, Myron M. Parker, attorney for the United States Potash Producers' Association, in a letter to Senator Smoot of Utah, has furnished the Senate with many pertinent facts regarding this somewhat misunderstood business.

In the letter, which Senator Smoot had incorporated in the Congressional Record, Mr. Parker said:

"As you are aware, Representative Fordney, on the 4th of June, introduced a bill in the House to encourage and protect for a limited time the potash industry of this country. The Ways and Means Committee have concluded their hearings on the bill, and it is expected that it will be reported to the House at an early date.

"Under the provisions of this bill domestic potash, when mixed with imported potash at \$1.50 a unit, the present market price, would be sold to the farmers for the first 24 months at \$1.83 a unit, for the next 12 months at \$1.75, and for the next two years at \$1.50 or less. The difference in price is so small that no hardship would be imposed on the farmers.

"When the importation of German potash was stopped by reason of the war, the Department of the Interior and the War Industries Board urged upon our people the necessity of developing the domestic potash industry. Congress made an appropriation of \$45,000 to aid in this effort. Dr. Gale, of the Geological Survey, and other experts of the government on investigation found that in Searles Lake, Calif., there was potash enough to supply our domestic needs for 100 years. They discovered that in the Nebraska lakes there was even more potash than in Searles Lake.

"In addition to these sources of supply, potash is now made from cement plants,

from beet sugar, from lucite in Wyoming and alunite in Utah, from the green sands of New Jersey, and from many other sources. As a result, these plants which have recently reached completion and which are now in operation, can produce 125,000 tons of potash a year, and if given protection for three years will more than supply all our domestic requirements, thereby preventing future foreign monopoly.

"Over \$40,000,000 have been expended in the development of the industry. So far as is known, only one plant has been able to amortize itself. Unless protection is given all these millions will be lost and, what is of far greater importance, the American industry, an industry that was encouraged and fostered by the government, will be killed.

"In a magazine article 'Victory,' submitted to the Senate by Senator Frelinghuysen on the 18th instant, many mis-statements are made. One statement was to the effect that imported potash would cost only \$50 a ton. The facts are the lowest price imported potash is now offered at is \$1.50 a unit, which would be \$150 a ton and not \$50 as stated in the magazine article. The article contained many other statements equally absurd.

"The Department of Commerce reports that economic conditions are more changed in Germany and France than they are in the United States, so much so that potash will probably never be sold at less than \$150 a ton, the price now asked."

Customers Wait and Bid at Pits for Sand and Gravel in Dallas, Texas

DALLAS, TEXAS—Although Dallas county has not yet begun the construction of the system of good roads for which a bond issue of \$6,000,000 was recently voted, there is a gravel famine in the county, according to George D. Fairtrace, city engineer.

"During the heavy rains in May and June," he said, "most of the gravel pits in this county were shut down, as they were full of water most of the time. Some gravel pits have been fitted with storm sewers to carry off water.

"Dallas county needs 50 gravel pits, 35 to 40 more than it has now, and this need will be felt more keenly when the great road-building program is under way. Gravel is now selling at \$1.35 to \$1.50 a cu. yd. at the pits. It costs about \$2.31 f. o. b. Dallas, and about 25 cents a cu. yd. to unload and 40 cents a cu. yd. cartage; total, about \$3 a cu. yd.

"The gravel is usually sold at the pit to the highest bidder."

The Rock Products Market



Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Akron, N. Y.	.60	.60	1.00	1.00	1.00	1.00
Auburn and Syracuse, N. Y.	.80	1.20	1.20	1.20	1.20	1.20
Buffalo, N. Y.	1.50	1.75	1.65	1.35@1.50	1.75	1.25
Burlington, Vt.			1.65	1.50@2.10	1.25	1.25
Chaumont, N. Y.			1.65	1.50	1.25	1.10
Coldwater, N. Y.	.75	1.85	.75	1.00	1.00	1.00
Grove, Md.	1.00	1.00	1.50	1.50	1.50	1.50
North LeRoy	1.25	1.40				
Waldorf, Pa.			1.00	1.00	1.00	
CENTRAL:						
Alden, Ia.	.40		1.00	1.00		
Alton, Ill.	1.86		1.50	1.40		
Anna, Ill.			1.00@1.25 for prepared sizes			
Belvidere, Ill.			1.00 for any size produced			
Bettendorf, Ia.	1.25	1.25	1.25	1.25	1.25 (2300 lbs.)	
Brillion and Sherwood, Wis.	.90@1.00		1.00	1.00		1.00
Davenport, Ia.	1.40	1.30	1.30	1.20	1.20	1.20
Dundas, Ont.	.65	1.05	1.05	1.05	.85	.85
Eden and Knowles, Wis.	.80@1.00	.80	1.00	1.00	1.00	1.00
Elmhurst, Ill.	(¼-in. 1.25)		1.00 (Se'gs .85)		.85	.85
Grass, Mich.			1.00, all sizes			
Greencastle, Ind.	1.00@1.25	1.10	1.00	.90	.90	.90
Illinois, Southern	1.50	1.25	1.25	1.25	1.00	
Kokomo, Ind.			.90@1.00 all sizes			
Lannon, Wis.			1.00 all sizes			
Lewisburg, O.	.80@1.00		1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10
Mankato, Minn.			(1-in. 1.50)	(2-in. 1.25)		
Mayville, Wis.	.75	.75@.90	1.00	1.00	1.00	1.00
McCook, Ill.	.90@1.10	1.50	.80@1.00	.70@.85	.70@.80	.70@.80
Oshkosh, Wis.		1.15	1.00 in all sizes, Blue Limestone			
River Rouge, Mich.	.80@.85	1.15	1.15	1.15	1.15	1.15
Sheboygan, Wis.			1.00@1.10 for all sizes			
Stone City, Ia.	.50		(1-in. 1.40)	1.30	1.20	
Toronto, Can.	1.55	1.95	1.95	1.95	1.75	1.75
These prices include 90c freight						
SOUTHERN:						
Brooksville, Fla.	1.00		2.50			
Cartersville, Ga.		1.60	1.50	1.50		
Fort Springs, W. Va.	1.00	1.20	1.40	1.60	1.40	
Hopkinsville, Ky.	1.10		1.60	1.00	1.00	
Mascot, Tenn.		1.00@1.25				
Memphis Junction, Ky.			Average 1.10			
WESTERN:						
Atchison, Kans.	.50	1.80	1.80	1.80	1.70	1.70
Blue Springs and Wymore, Neb.	.15	1.55	Rip-Rap, 1.30	1.45@1.50	1.35@1.40	1.30
El Paso, Tex.			1.00 for all sizes			
Kansas City, Mo.	.60	1.35				
New Brownfels, Tex.	.60	1.25@1.50	1.00@1.30	1.00@1.25	.90@1.10	

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.—Trap		2.90*	2.50*	2.15*	Bronze	1.60*
Birdsboro, Pa.—Trap	1.25	1.80	1.70	1.60	1.50	1.25
Branford, Conn.—Trap	.80	1.50	1.50	1.20	1.10	
Castro Pt., Richm'd, Cal.—Trap	.50*	1.40*	1.40*	1.30*	1.20*	
Duluth, Minn.—Trap	.65@.75	1.40@1.50	1.25@1.35	1.10@1.15	1.10@1.15	1.00
Farmington, Conn.—Trap		1.05	1.05	1.05	.95	
Glen Mills, Pa.—Trap	1.00	1.35	1.70	1.55	1.35	1.40
Millington, N. J.—Trap	1.90	1.80	1.80	1.60	1.40	
New Britain, Conn.—Trap	.75	1.20	1.15	1.10	1.00	
Oakland, Calif.—Trap		1.75*	1.75*	1.75*	1.75*	
Rock Hill, Pa.—Trap	1.00	1.35	1.70	1.55	1.35	1.35
Westfield, Mass.—Trap	.60	1.20	1.20	1.00	.90	
Winchester, Mass.	.75	.75	1.60	1.45	1.25	1.25

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Atlanta, Ga.—Granite	1.60		2.85	2.35	2.35	
Fair Oaks, Calif.—Cr. Bldrs.	.85	1.05	.95	.85	.85	
Hendlers, Pa.—Quartzite	.80	1.00	1.25	1.00	1.00	1.00
Little Falls, N. Y.—Syenite	.80	1.20	1.40	1.20	1.20	1.20
Middlebrook, Mo.—Granite	3.50		1.75	1.75		1.00
Roseburg, Ore.		1.50	1.25	1.05	1.00	1.00
Smith Siding, Richmond, Va.—Granite	1.25		1.50	1.50	1.50	
Stockbridge, Ga.—Granite	.75	2.00	1.75	1.75	1.75	
White Haven, Pa.—Sandstone	.85	1.20	1.40	1.20	1.20	1.20

*Cubic yard. †Ag'l. lime. ‡R. R. ballast. §Flux. †Rip-rap. a 3-inch and less.

Agricultural Limestone Wholesale at Plant, per Ton

EASTERN:

Coldwater, near Rochester, N. Y.—Analysis: CaCo ₃ , 56.77%; MgCo ₃ , 41.74%—80% thru 100 mesh; ppr., 4.50; bulk	3.00
Chaumont, N. Y.—Analysis: CaCo ₃ , 92 to 98%; MgCo ₃ , 1.51%—(Thru 100 mesh); ppr., 4.00; bulk	2.50
Cobleskill, N. Y.—Ppr., 5.00; bulk	3.00
Grove City, Pa.—Analysis: CaCo ₃ , 94.75%; MgCo ₃ , 1.20%—(70% thru 100 mesh); 80 lb. ppr., 4.60; bulk	3.25
Grove, Md.—90% thru 4 mesh; bulk	3.00
Hillsville, Pa.—Analysis: CaCo ₃ , 85%; MgCo ₃ , 1½%—(70% thru 100 mesh) in 80 lb. ppr. bags, 4.25; bulk	2.75
Jamesville, N. Y.—68% thru 100 mesh; 95% thru 50; 100% thru 20. Sacks, 3.75; bulk	2.25
Lime Kiln, Md.—50% thru 50 mesh; bulk	4.00
Pownal, Vt.—(50% thru 100) Analysis: CaCo ₃ , 90%; MgCo ₃ , 5%; ppr., \$4.50; bulk	2.75
Waldorf, Pa.—(70% thru 100 mesh; 85% thru 50; 50% thru 50; 100% thru 4); sacked, 4.25; bulk	2.75
West Stockbridge, Mass.—Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk	2.85

CENTRAL:

Alton, Ill.—Analysis: CaCo ₃ , 96%; MgCo ₃ , .75%—90% thru 100 mesh. 50% thru 50 mesh	3.00
Anna, Ill.—Ground; bulk	1.25
Bedford, Ind.—(90% thru 10 mesh) Analysis: CaCo ₃ , 98.5%; MgCo ₃ , 0.5%	1.75
Belleville, Ont.—50% thru 100 mesh	2.50
Canton, O.—100% thru 10 mesh; 40% thru 100; 59% thru 50	3.00
Columbia, Ill., near East St. Louis —(¼" down)	1.25@1.80
Elmhurst, Ill.—(Analysis: CaCo ₃ , 35.73%; MgCo ₃ , 20.69%) 50% thru 50 mesh	1.25
Greencastle, Ind.—(Analysis: CaCo ₃ , 98%) 50% thru 50 mesh	1.75
Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100	2.75@3.00
Lannon, Wis.—(90% thru 50 mesh) Analysis: 54%, CaCo ₃ ; 44%, MgCo ₃	2.00
Marble Cliff, O.—(50% thru 100 mesh) Analysis: CaCo ₃ , 86%; MgCo ₃ , 8%	3.00
Marblehead, O.—(Analysis: CaCo ₃ , 95.33%) 50% thru 100 mesh	3.00@4.50
McCook, Ill.—Analysis: CaCo ₃ , 54.10%; MgCo ₃ , 45.04%—100% thru ¼" sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 26.04% thru No. 50; 16.27% thru 100	.90@1.00
Milltown, Ind.—Analysis: CaCo ₃ , 94%; MgCo ₃ , 3%	1.50
Montrose, Ia.—(90% thru 100 mesh)	1.25@1.35
Muskegon, Mich.—(90% thru 50 mesh) Analysis: CaCo ₃ , 53.35%; MgCo ₃ , 43.27%	2.50
Piqua, O.—Analysis: CaCo ₃ , 32.8%; MgCo ₃ , 3.2%; neutralizing power in terms of calcium carbonate, 95.3%—70% thru 100 mesh, bulk	2.50@4.00
Rockford, Ill.—Analysis: CaCo ₃ , 53.75%; MgCo ₃ , 44.35%	1.25
Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ¼" mesh) Analysis: CaCo ₃ , 89.61 to 89.91%; MgCo ₃ , 3.82%	1.50
Stone City, Ia.—(90% thru 50 mesh) Analysis: CaCo ₃ , 98%	.50

(Continued on next page.)

Agricultural Limestone Wholesale at Plant, per Ton

(Continued from preceding page.)

Toledo, O.—Analysis, CaCo ₃ , 52.72%; MgCo ₃ , 43%—(20% thru 100 mesh; 30% thru 50; 80% thru 100; 100% thru 5/32 screen).....	1.80
Whitehill, Ill.—Analysis, CaCo ₃ , 96.12%; MgCo ₃ , 2.50%—50% thru 50 mesh, bulk.....	1.50
90% thru 100 mesh.....	5.00
SOUTHERN:	
Dittlinger, Tex.—Analysis, CaCo ₃ , 99.09%; MgCo ₃ , 40%.....	2.00
90% thru 100 mesh.....	2.00
90% thru 4 mesh.....	1.00
Grovania, Ga.—Analysis, CaCo ₃ , 95%; MgCo ₃ , none—50% thru 100 mesh.....	2.50
Hopkinsville, Ky.—Analysis, 94.6 to 98.1% CaCo ₃ —Bulk.....	2.00
Memphis Jct., Ky.—(Analysis, CaCo ₃ , 95.31%; MgCo ₃ , 1.12%) average price.....	2.00
Ladd, Ga.—Analysis: 96 to 98% combined carbonates—All thru 10 mesh with all dust in.....	2.50
Mascot, Tenn.—Analysis, CaCo ₃ , 52%; MgCo ₃ , 38%.....	2.50
(80% thru 100 mesh).....	2.00
(All thru 10 mesh).....	2.00
Paper bags \$1.50 extra per ton; burlap, 2.00 extra per ton.....	
Tyrone, Ky.—Analysis, CaCo ₃ , 93%; MgCo ₃ , 6%—90% thru 4 mesh.....	2.25
Winnfield, La.—(50% thru 50 mesh).....	4.50
WESTERN:	
Fresno, Calif.—(Analysis, CaCo ₃ , 94%; MgCo ₃ , .02%) 50% thru 200 mesh; 90% thru 100; 100% thru 40. Prices for delivery: Sacks, 6.50; bulk Sacks, 10c each.....	6.00
Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk.....	1.50

Miscellaneous Sands per Ton at Plant

Silica sand is quoted washed, dried and screened, unless otherwise stated.

GLASS SAND:

Berkeley Springs, W. Va.—Glass.....	2.00@2.10
Special hand selected rock.....	2.50
Bowmanstown, Pa.—Glass sand.....	2.50
Cedarville and South Vineland, N. J.—Glass, damp.....	2.00
Glass, dry.....	2.50
Gray Summit, Mo.—Glass.....	2.00@2.50
Guion, Ark.—Glass on contracts.....	1.50
Hancock, Md.—Engine and glass.....	2.50@3.09
Klondike and Pacific, Mo.—Glass: Contracts.....	2.00
Carlots.....	2.50
Mapleton, Pa.—Glass, dry.....	2.50@2.75
Glass, damp.....	2.00@2.25
Massillon, Ohio—Glass.....	3.00
Michigan City, Ind.—Glass sand.....	.40
Millington, Ill.—Glass.....	1.75@2.00
Mineral Ridge, O.—Glass.....	2.75
Montoursville, Pa.—Glass, green, washed.....	2.00@2.75
Ottawa, Ill.—Glass.....	2.00
Large contracts.....	1.75
Robinson, Md., washed, screened, not dried.....	2.00
Sands, Elk Co., Pa.—Glass sand: Selected, green.....	2.50
Thayer, W. Va.—Glass.....	2.75

FOUNDRY SAND:

Albany, N. Y., at plant—Core.....	1.25@2.25
Molding, fine and coarse.....	1.65@2.00
Sand blast sand.....	1.50@3.00
Brass molding.....	1.65@2.00
Allentown, Pa.—Core.....	1.20@1.40
Arenzville, Ill.—Molding fine.....	1.50
Berkeley Springs, W. Va.—Roofing.....	2.00
Bowmanstown, Pa.—Core.....	1.25
Molding fine or coarse.....	1.50
Roofing sand.....	3.00
Cedarville and So. Vineland, N. J.—Core, damp.....	2.00
Core, dry.....	2.50
Cleveland, O.—Core, on car.....	1.00@1.25
Molding fine, on car.....	1.75@2.25
Molding coarse, on car.....	1.50@2.25
Brass molding, on car.....	1.25@2.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	.60	.60	.60	.75	.75	.75
Boston, Mass. (On Docks).....	1.25	1.00	1.75	1.70	1.60	1.60
Buffalo, N. Y. (Niagara River)	.80	.80	.75	.75	.75	.75
Farmingdale, N. J.	.43	.43	1.25	1.05	1.05	1.05
Morristown, N. J.	.60	.60	1.20	1.00	1.00	1.00
Pittsburgh, Pa.	.90@1.00	.90@1.00	.90@1.00	.70@.80	.70@.80	.70@.80
Washington, D. C.—Wharves.....	.75	.75	2.00	1.40	1.20	1.20
CENTRAL:						
Anson, Chippewa Co., Wis.	.50	.50	.95	.85	.85	.85
Harton, Wis.	.75	.70	1.00	.70	.70	.70
Chicago	1.25@1.50	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Cincinnati & Miami Grove, O.	.60@.80	.55@.75	.55@.75	.55@.75	.55@.75	.55@.75
Columbus, O.	.65	.65	.60	.70	.70	.65
Des Moines, Ia.	50@1.00	.50	1.50	1.50	1.25	1.25
Earlestead, near Flint, Mich.	.55@.60	.55@.60	.85@.90	.75@.80	.75@.80	.75@.80
Escanaba, Mich.	.90	.90	1.60	1.20	1.00	.90
Fort Dodge, Ia.	1.10	1.00	1.80	1.80	1.80	1.80
Fort Jefferson and Mechanicsburg, O.	.50@.60	.50@.60	.50@.70	.50@.70	.50@.70	.50@.70
Grand Rapids, Muskegon, and Holland, Mich.	.40@.50	.40@.50	.60@.70	.80@1.10	.70@.80	.70@.80
Hersey, Mich.	.50	.50	.75	.60@.75	.60@.75	.60@.75
Illinois, Northern	.50@.60	.60@.70	.75	.60@.75	.60@.75	.60@.75
Indianapolis, Ind.	.50	.50	.60	.60	.60	.60
Janesville, Wis.	.50	.50	.60	.60	.60	.60
Lafayette, Terre Haute and Richmond, Ind.	.40@.60	.40@.60	.40@.60	.50@.70	.50@.70	.50@.70
Mason City, Ia.	.60	.50	1.45	1.35	1.30	1.25
Railway ballast and road work, 1.20 for all sizes						
Milwaukee, Wis.	.60	.60@.80	1.20	1.10	1.00	1.00
Moline, Ill.	.75	.75	.85	.75	.75	.75
Montezuma, Covington, Ind.	.55	.55	.90	.90	.80	.80
Oxford, Mich.	.60@.65	.60@.65	.60@.65	.60@.65	.60@.65	.60@.65
Rockford, Ill.	.95	.95	1.60	1.60	1.60	1.45
Saginaw, Mich. (Includ'g frt.)	2.20	2.20	2.20	2.20	2.00	1.75
St. Louis, Mo.	1.35	1.20	1.50	1.30	1.25	1.25
St. Louis, Mo., F. O. B. cars.	.75	.75	.75	.75	.75	.75
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.70	.70	1.60	1.10	1.10	1.10
Winona, Minn.	.90@.95	.90@.95	.90	.90	.90	.90
SOUTHERN:						
Dudley, Ky.	.85	.85	1.50	1.50	1.50	1.10
Flomaton, Ala.	.50	.50	.50	.50	.50	.50
Knoxville, Tenn.	.80	.80	.80	.80	.80	.80
Lake Weir, Fla.	1.30	.90@1.00	1.00	1.00	.60@.80	.60@.80
Macon, Ga.	.55	.55	.55	.55	.55	.55
Memphis, Tenn.	.60	.60	.60	.60	.60	.60
New Martinsville, W. Va.	.80	.80	.80	.80	.80	.80
Pelzer, S. C.	.60	.60	.60	.60	.60	.60
Roseland, La., and Condron, Miss.	.40	.40	.40	.40	.40	.40
Thomas, La.	.60	.60	.60	.60	.60	.60
Waco, Texas	.80	.67	.67	.67	.67	.67
WESTERN:						
Kansas City, Mo.	.60	.60	.60	.60	.60	.60
Lincoln, Neb. (on cars).....	1.00	1.00	2.10	2.10	1.50*	1.90
Pueblo, Col.	.80*	.60*	.60*	.60*	.60*	.60*
Roseburg, Ore.	1.00@1.25	1.00	1.25	1.00	1.00	1.00
San Francisco, Calif.	1.15	1.15	1.20	1.20	1.20	1.20
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Vancouver, B. C.	1.10*	1.10*	1.30*	1.30*	1.30*	1.10*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	.50	.50	.50	.65	.65	.65
Boonville, N. Y.	.65	.45@.65	.45@.65	.45@.65	.45@.65	.45@.65
Burnside, Conn.	.80*	.80*	.80*	.80*	.80*	.80*
Lowell Junction, Mass.	.75*	.65*@.75*	.60*	.60*	.60*	.60*
Pittsford, N. Y.	.50@.55	.50@.55	.50@.55	.50@.55	.50@.55	.50@.55
Yardville, N. J.	.50@.75	.50@.75	.50@.75	.50@.75	.50@.75	.50@.75
York, Pa.	1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10	1.00@1.10
CENTRAL:						
Anson, Chippewa Co., Wis.	.60	.60	.60	.60	.60	.60
Beloit, Wis.	.60	.60	.60	.60	.60	.60
Des Moines, Ia.	.60	.60	.60	.60	.60	.60
Escanaba, Mich.	.60	.60	.60	.60	.60	.60
Gr'd Rapids, Muskegon, Mich.	.60	.60	.60	.60	.60	.60
Hersey, Mich.	.60	.60	.60	.60	.60	.60
Illinois, Northern	.60	.60	.60	.60	.60	.60
Indianapolis, Ind.	.60	.60	.60	.60	.60	.60
Janesville, Wis.	.60	.60	.60	.60	.60	.60
Moline, Ill.	.80	.80	.80	.80	.80	.80
Oxford, Mich.	.80	.80	.80	.80	.80	.80
Rockford, Ill.	.80	.80	.80	.80	.80	.80
Saginaw, Mich. (Includ'g frt.)	1.05	1.05	1.05	1.05	1.05	1.05
Summit Grove, Ind.	.60	.60	.60	.60	.60	.60
Wabash Valley District, Ind.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
SOUTHERN:						
Albany, Ga.	.60@1.00	.60@1.00	.60@1.00	.60@1.00	.60@1.00	.60@1.00
Lindsay, Texas	.75@1.10	.75@1.10	.75@1.10	.75@1.10	.75@1.10	.75@1.10
Thomas, La.	.60	.60	.60	.60	.60	.60
Valde Rouge, La.	.60	.60	.60	.60	.60	.60
Waco, Texas	.60	.60	.60	.60	.60	.60
WESTERN:						
Pueblo, Colo.	.60	.60	.60	.60	.60	.60
San Francisco, Calif.	.60	.60	.60	.60	.60	.60

* Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag Wholesale at Plant Per Ton

City or shipping point	Screenings, Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Buffalo	1.75	.85	.85	.85	.85	.85	.85
E. Canaan, Conn.	3.00	1.00	1.50	1.15	1.10	1.10	1.10
Erie, Pa.	1.75	.85@1.00	1.00@1.50		1.00	1.00	1.00
Emporium, Pa.		1.00	1.00		1.00	1.00	1.00
Ensley, Ala.	2.05	.90		.90@1.20	1.00	.90	.85
Hokendaugua and Topton, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Lebanon (Donaghmore), Pa.	2.50	.85	1.50	.85	.85	.85	.85
Philadelphia Dist.	2.50	.75	1.50	.85	.85	.85	.85
Pittsburgh Dist.	2.50	1.00	1.50	1.00	1.00	1.00	1.00
Sharpsville, Pa.	1.75	1.00	1.25	1.00	1.00	1.00	1.00
WESTERN:							
Chicago, Ill.			All sizes, \$1.50, F. O. B. Chicago				
Detroit, Mich.			All sizes, 1.65, F. O. B. Detroit				
Ironton and Jackson, O.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
Toledo, O.			All sizes, 2.00, F. O. B. Toledo				
Youngstown, Dover, Hubbard, Leetonia, and other Ohio points	1.75	1.00	1.25	1.00	1.00	1.00	1.00

Agricultural Lime and Hydrate Wholesale at Plant per Ton

	— Agricultural Lime—		Per Cent	Per Cent	Agricultural
	Bulk	Bags	CaO	MgO	Hydrate
EASTERN—					
Alton, Ill.		9.50			
Berkeley, R. I.		16.00	45	15	
Bellefonte, Pa.		7.25	95.5	.72 to .89	
Bridgeport, Pa.		7.50	55	44	10.25
Canton, O.		9.00			
Cavendish, Vt.		2.50 bbl. in car lots			
Cavetown, Md.		8.50			
Cedar Hollow, Devault, Rambo and Swedeland, Pa.		8.00	10.75 grd.	58	38
Chippewa, Lycoming Co., Pa.	5.00@5.50		78.67	1.33	10.75
Delaware, O.		4.50	50	5 to 12	8.50
Espy, Pa.		7.00 imp.	75.48	0.80	10.00
Grove City, Pa.			70		12.45
Harrisburg, Pa.		6.50	94.95	.30	
Hollidaysburg, Pa.		5.00	78.67	1.33	
Lime Bluff, Pa.			54 & 95	40 & 1.75	10.00
Manistique, Mich.		10.00			8.75
Marblehead, O.		2.25	3.75		11.00
Mitchell, Ind.		9.00			
Mt. Union, Pa.		4.13	96.6		8.00
Newburgh, N. Y.			95	1.5	
Ottawa, Ont.		12.00	33.62	17.73	9.00
Springfield, O.					
Steuben, Pa., Dover Plains, N. Y., York, Pa.		8.50@9.50	70	10.75 to 12.00	
West Rutland, Vt.		5.00	68	3	10.00
Williamsport, Pa.	5.00@5.50		80 to 90	2 to 3	
Zylontte Station, Adams, Mass.		8.00			
WESTERN—					
Kirtland, N. M.		10.00			
Knowles, Wis.		8.00	55	45	9.50
Lime, Ore.		15.00	91.48	0.58	
Oscas Island, Wash.			5.50		16.50
Tehachani, Cal.		6.00	96	2	
SOUTHERN—					
Blakely, Ga.		3.00			
Bristol, Tenn.		5.50			
Knoxville, Tenn.		2.00	57	3	
Louis Brook, Va.		8.00	90	1	
Newala, Ala.		8.50@9.00	99.33		
Ocala, Fla.		4.00	6.00 pulv.	98½ (dry basis)	

Ground Gypsum Rock, per Ton, at Plant

Castalia, O.—Raw, to cement mills.....	3.50
Crushed, not ground.....	3.00
Land plaster.....	6.00
Fort Dodge, Ia., bulk.....	3.00
Garhutt, N. Y.—Land plaster, bags.....	6.00
Grand Rapids, Mich.—Crushed gypsum.....	3.00
Ground gypsum rock.....	7.00
Gypsumville, Man., Can.....	3.00
Oakfield, N. Y.....	6.00
Sandusky, O.....	6.00

Jute sacks, \$3.00 extra; paper, \$1.00 extra.

Miscellaneous Sands per Ton at Plant

(Continued from preceding page)	
Delaware, N. J.—Molding.....	1.50@2.00
Eau Claire, Wis.—Core.....	1.75
Roofing sand.....	3.00
Brass molding and sand blast.....	2.25
Fleetwood, Pa.—Silica heating.....	2.00
Franklin, Pa.—Core, traction and brass molding.....	2.00
Molding, fine.....	2.00
Molding, coarse.....	1.50@1.75
Gray Summit, Klondike and Pacific, Mo.—Molding fine.....	1.50@2.00

Greenville, Ill.—Molding coarse red.....	1.60
Hancock, Md.—Core and brass mldg.....	1.65
Hellam, Pa.—Core.....	2.00
Ioplin, Mo.—Stone sawing, flint.....	1.25
Kansas City, Mo.—Missouri River core.....	.85
Leesburg, Pa.—Core, furnace lining, molding fine and coarse.....	2.00
Mapleton, Pa.—Molding, fine and core, damp.....	2.50
Molding, fine, dry.....	3.00
Massillon, O.—Steel molding coarse.....	2.50
Furnace lining.....	3.00
Core.....	2.50
Michigan City, Ind.—Core, bank.....	.40
Millington, Ill.—Core, furnace lining, damp.....	1.50
Roofing.....	2.00
Mineral Ridge, O.—Core, molding, sand blast, roofing, brass molding, etc., washed, screened.....	2.00
Montonsville, Pa.—Core, molding fine, traction.....	1.25@2.00
Brass molding.....	1.25@2.00
Ohio—Various points:	
Iron molding, fine.....	1.50@2.25
Iron molding, coarse.....	1.75
Brass molding, minimum.....	2.00
Ottawa, Ill.—Brass molding.....	2.00
Ottawa, Ill.—Sand blast sand.....	3.50
Stone sawing.....	2.00
Core and roofing.....	2.00
Traction sand.....	2.00
Furnace lining.....	1.50

Thayers, Pa.—Core and traction.....	2.00
Warwick, O.—Core.....	2.25
Furnace lining, green.....	2.00
Dried and screened.....	2.25
Molding, fine.....	2.50
Molding, dried and screened.....	2.25
Green.....	1.75@2.00
Wedron, Ill.—Molding.....	.75@1.00
West Albany, N. Y.—Molding fine.....	1.75@2.25
Molding coarse.....	1.25
Brass molding.....	1.75
Thayers, Pa.—Molding, fine.....	1.00@1.25
Molding, coarse, furnace lining.....	1.00
Zanesville, O.—Molding fine and coarse, brass molding.....	1.25

Ground Rock Phosphate at Plant, per Ton

Centreville and Gordonsburg, Tenn.—B. P. L., 60% to 72%; ton, 2240 lbs. Ground rock phosphate (90% thru 100 mesh).....	6.00@8.00
Lump rock, 72% to 75%, B. P. L.....	6.00@8.50
Centreville, Tenn.—B. P. L., 60%.....	7.00
B. P. L., 70% and 78%.....	8.00
Jacksonville (Fla.) District—Soft phosphate.....	10.00@12.00
(Add 2.50 for sacks)	

Mt. Pleasant, Tenn.—(B. P. L., 70%)	
12%.....	6.00
13%.....	7.00
14%.....	8.00
Mt. Pleasant, Tenn.—B. P. L., 60% to 70%.....	6.00@8.00
Nichols, Fla.—Pebble, B. P. L., 70%.....	10.00
Phoslime, Fla.—Soft.....	14.00@17.50
Walls, Tenn.—B. P. L., 70.2%—To County Agri. Assns.....	7.50
To others.....	7.75

Sand and Gravel Business Good in Knoxville, Tenn.

KNOXVILLE, Tenn.—Unprecedented activity by the sand and gravel dredging companies on the Tennessee river is recorded on account of the building boom Knoxville is experiencing. The enormous amount of sand and gravel which will be needed to erect the Gay street viaduct is the leading item now in the sand and gravel dredging industry. Street improvement which is extensive at this time, and the large number of dwelling and business houses which are going up are creating large orders. Companies on the river are rushing their facilities to supply the great demand.

Toledo Has New Sand Dock

THE FIRST BOAT LOAD of sand was unloaded July 14 at the immense new sand docks of the Toledo Pulp Plaster Co. These docks extend for three blocks along the river front from Magnolia to Olive on Summit streets, and are paralleled by three tracks, giving a siding capacity of 2500 ft., or approximately 50 cars.

Work has been in progress here for the last month, and when entirely completed will give to Toledo the largest sand docks on the Great Lakes.

Storage bins with a capacity of 10 carloads are part of the equipment and will be capable of loading a five-ton truck with sand in five seconds.

General News From The Rock Products Markets

Interpretation of Standard Lime Barrel Law

A MEMBER OF THE Lime Association packed a shipment of special hydrated lime for a special manufacturing purpose in the small sized standard lime barrel. The hydrate in these barrels was specially packed and protected, with the result that their net weight when packed was 150 lbs. each. This weight was stencilled on the head of the barrel together with the name of the manufacturer and the name of the consignee. The manufacturer in making this shipment relied upon section 3 of the Standard Lime Barrel Law, which says:

When lime is sold in interstate or foreign commerce in containers of less capacity than the standard small barrel, it shall be sold in fractional parts of said standard barrel, and the net weight of the lime contained in such container shall by stencil or otherwise be clearly marked thereon, together with the name of the manufacturer thereof, and the name of the brand, if any, under which it is sold, and, if imported, the name of the country from which it is imported.

His contention hinges upon the meaning of the word "containers." The Bureau of Standards construes this word to mean any container except a barrel. This section of the law was designed by Congress to cover the usual paper bag in which hydrate is shipped, but when this word "containers" is interpreted in connection with Section 2 of the law, it is held by the Bureau of Standards that it cannot mean barrels, because the only two kinds of barrels which are lawful are the 180-lb. barrel and the 280-lb. barrel. Therefore, Congress did not mean that a smaller sized barrel than the 180-lb. standard barrel could be used.

The Standard Lime Barrel law was enacted to standardize the size of barrels, which, of course, operates largely to the benefit of the lime industry and eliminates a multitude of different sized barrels which otherwise it would be necessary for manufacturers of lime to use.

Manufacturers are requested to take note of this incident. If any other details are desired by any member, we shall be glad to supply them. Copies of the Standard Lime Barrel law will be sent to any member upon application.—Weekly Letter of the Lime Association.

Illinois Building Shows Increase

FROM the Springfield, Ill., Register, it is learned that since January 1 building permits totalling a cost of \$494,378 have been issued, and compared with \$394,443 for the same period in 1918, show an increase of \$99,443.

During June, 1919, the number of permits show an increase of 80 per cent over June of 1918.

Future of Agricultural Lime

THERE IS LITTLE DOUBT that with proper consideration and proper working out, the views of the agricultural world can be brought into much closer harmony with those of the lime manufacturers to the manifest and great advantage of our industry, says a recent weekly letter of the Lime Association. It says further:

"When the actual agronomic values of all types of liming material have been scientifically ascertained by means and through agencies which will appeal to the agricultural authorities of the United States as conclusive, it will for the first time, be possible for manufacturers of agricultural lime to place before their customers the precise benefits they will secure by the use of this type of liming material in preference to any other.

"Many experiments are now in progress in the several state experiment stations and agricultural colleges, the results of which are generally to our advantage, but unfortunately are local in their influence because of the local influence of the respective state institutions. It requires a nationally recognized organization to establish these facts nationally and thus to present to the farmers of the United States the facts as we should like to have the farmers know them."

Lime as a Germicide

T. B. SHERTZER, eastern district engineer of the Lime Association, has reported to the Association a rather novel use of lime in the application which the Interborough Rapid Transit Co., New York City, has been making of crushed lime on the tracks of the subways at the various stations to act as a germicide and overcome the danger of infection due to the practice of the public in expectorating on the tracks while waiting for trains. It would seem as though this thought is one which lime manufacturers might promote to advantage in all congested centers of population where they do business. There is probably no other chemical having germicidal properties along this line sufficiently cheap in price to be effectively used for this purpose. There is no offensive odor and there is a marked improvement in the general character of the air where lime is so used. We are preparing to call this use for lime to the attention of the various boards of health in the larger cities throughout the country.—General Manager Hall, of the Lime Association.

Gravel Association will Publish Monthly Magazine

THE SECRETARY of the National Association of Sand and Gravel Producers has announced that arrangements have about been completed for the Association to take over the "Ohio Sand and Gravel Bulletin," now published by the Ohio Sand and Gravel Producers' Association, as the official organ of the National Association.

The object of the new publication will be not only to furnish a medium for National and State Association news and activities, but ultimately to be able to extend its circulation to engineers, architects and contractors—users of sand and gravel—and to lay before them the virtues of sand and gravel in attractive and digestible form.

In adopting this scheme the Sand and Gravel Association is following the example of the Cement, Brick, Asphalt and many other material associations, which apparently have had very satisfactory results.

New Egyptian Portland Cement Co. Reorganized

OPERATION of the New Egyptian Portland Cement Co. plant near Fenton, Michigan, has been resumed by a syndicate headed by John G. Gillespie, former Detroit police commissioner, which recently acquired the property from the Security Trust Co., receiver, after purchasing the stock and settling with the cement company's general creditors on the basis of 27 cents on a dollar. It is announced that the company will soon be turning out its maximum production of 1,400 to 1,500 bbls. per day.

E. R. Sullivan, formerly with the Peerless Cement Co., Union City, Mich., has been made general manager of the New Egyptian company and its offices, formerly in Detroit, will hereafter be at the plant, which is on the shore of Silver lake, two miles west of Fenton on the Grand Trunk railway, says the Detroit Free Press.

The company's property includes about 800 acres of marl land, which is said to be equal to any in the state. Before resuming operation, the new management gave the plant a thorough overhauling, expending many thousands of dollars on improvements and renewals. The capital comprises \$500,000 in stock and \$200,000 in first mortgage bonds.

The receiver was appointed by Judge A. J. Tuttle in April, 1918. The company had experienced much difficulty in the winter of 1917-18 due to coal shortage and government restrictions.



Incorporations

J. S. McLaughlin & Son, Quarry. Redstone, Minn.

Blue Knob Crushed Stone Co., Wooster, O. Capital \$10,000; L. A. Yocum.

Canadian Marble Quarries, Limited, Toronto, has been incorporated with a capital of \$2,000,000 to develop quarries.

Queensbury Stone Co., capital \$15,000; Hudson Falls; marble; James E. Flood, William M. Bronk and John H. Davis.

Iroquois Sand & Gravel Co., Limited, Toronto, has been incorporated with a capital of \$300,000 to quarry sand and gravel.

Farmers Lime Company, Inc., \$20,000; Burns; Clifford L. Wilkins, Grace A. Wilkins, Delbert H. Wilkins, 46 Bennet Street, Norwell, N. Y.

New machinery is being placed in the Mensch stone quarries on Rattlesnake Hill, near Pottstown, and operations soon will be begun.

Consolidated Manganese Co., Inc., Portland; general mining, etc. Capital \$1,000,000; Pres. and treas., Griffith H. Riddle; clerk, Leonard A. Pierce.

Krider Building Material Company, \$25,000; Manhattan; Walter K. Krider, Anna Krider, David G. Godwin, 47 West Thirty-fourth Street, New York.

Service Products, Inc., \$20,000; Manhattan; manufacturing building materials; Joseph F. Walsh, Morris Davis, Edw. Turner, 296 Haven Avenue, New York.

Marion Sand and Gravel Co., Marion; capital \$30,000. Incorporators, Wilbur H. Symes, Geo. D. Copeland, John M. Sites, Hayes Thompson and John C. Bonen.

The Missouri Granite and Construction Company has filed application to decrease its capital stock from \$60,000 to \$10,000. Its assets are given as \$10,000 and liabilities none.

Grove Limestone Company, Orbesonia, Pa. Capital stock, \$10,000. To mine for limestone, etc. James L. Deavening, Orbesonia; James Reed, M. B. Johnson, Saltillo, Pa., incorporators.

Big Bend Gravel Co., Milwaukee, Wis., has organized with a capital of \$10,000 for the business of quarrying rock and digging gravel. Thos. A. Manning, Lyman G. Wheeler, R. S. Witte, incorporators.

Austin, Texas—The Chico-Bridgeport Cement and Stone Company has been incorporated at Chico, Wise county, with a capital stock of \$450,000. The incorporators are C. L. Johnson, E. C. Dodson and E. W. Rose.

American Tile Engineering Co., Mason City, Ia. Capital, \$50,000; Mine, quarry and excavate clay, sand, silica; manufacture brick, tile. President F. E. Keeler; Vice President, Wm. E. Wilson; Secretary, B. C. Keeler, all of Mason City, Ia.

Tenders will soon be called on a potash recovery plant for the Canada Cement Co., at Port Colborne, Ont., to cost \$150,000. The assistant superintendent is John Cuthbert, Port Colborne. The head office is at 275 Craig St., west, Montreal.

Crown Hill Quarry Co., at Milford, N. H. Capital \$25,000. For granite quarry business. Incorporators: Anthony J. Rossi, A. Herbert Spargo, William H. Shinkwin, John F. Pirovano, Ernest F. Rossi, Angelo Bernasconi, all of Milford, N. H.

New Martinsville Sand Co., at Martinsville, O.; \$80,000 capital stock; to manufacture concrete pipe and building materials; incorporated by J. R. Spease, W. T. Black, C. H. Toolman and G. G. Conoway, all of Fairmont, and J. C. McClain, of Point Marion, Penn.

The United Portland Cement Co., Ltd., has been federally incorporated with a capital of \$200,000 by R. M. Rodney, M. A. Pettit, J. W. Robinson, A. Butcher, Brantford and I. Rush. To manufacture, sell and deal in Portland cement, lime, limestone, crushed stone, etc.

Youngstown, O.—The Bessemer Limestone and Cement Co., capitalized in Ohio at \$3,000,000, has been formed to take the place of the Pennsylvania corporation known as the Bessemer Limestone Co., capitalized at \$1,000,000. The incorporators of the new company are John Tod, J. G. Butler, J. Stanbaugh, F. R. Kanengeiser and J. R. Rowland.

Phosphate

The Tennessee Copper & Chemical Co. have purchased a tract of phosphate lands in Tennessee. The Journal of Commerce of New York City says that the company intends to put up 10 new fertilizer factories with a total output of 50,000 tons per year.

Personals

Phillips F. Jarvis has resigned his position as sales manager for the territory controlled from the Sullivan Machinery Co., St. Louis office.

E. O. Floyd has been appointed general sales manager of The Rossendale Reddaway Belting & Hose Co., Newark, N. Y. This appointment will take place Aug. 1, 1919.

The following appointments have been made in the Sullivan Machinery Co.:

Marion C. Mitchell has been appointed sales manager for the territory in Indiana and Illinois, with temporary headquarters at room No. 2006 Railway Exchange, St. Louis.

Don M. Sutor, formerly manager of our El Paso office, has been appointed sales manager for the territory of western Kentucky, western Tennessee, Missouri, Arkansas, Oklahoma and Kansas (except the oil territory), with headquarters at room No. 2006 Railway Exchange, St. Louis.

Daniel H. Hunter has been appointed sales manager for Louisiana, Texas (except the south-western section), and the oil fields of Oklahoma and Kansas, with headquarters in Dallas, Texas.

Sand and Gravel

The Stilwell Sand and Gravel Company, at Anderson, Ind., is making preparations to install a 250-horsepower motor and other modern equipment at its pit at the east end of Ohio avenue. A large gravel pit will be opened there within a few weeks.

Grand Rapids, Mich.—G. W. Burcher, who operates a gravel pit in Wyoming township, Michigan, has a market for the stripping taken from his pit. It is furnished to the Lake Shore Railroad Company for road ballast, according to the Grand Rapids, Mich., Herald.

Galveston, Texas.—Governor Hobby of Texas has submitted a bill to the general assembly which would exempt from state fees, sand, gravel and marl to be used on highways and for public works. The Galveston, Texas, News believes that the prospects for the bill's passage are good.

The Attica, Ind., plant of the Neal Gravel Co. is incapacitated at present, due to the failure of the drag line tower. The company, which owns two other plants in Indiana, is contemplating replacing the structure at a site near the old one. For the present the Carmichael Sand and Gravel Co. is taking care of the Neal Gravel Co.'s orders.

The Western Indiana Sand and Gravel Co.'s plant at West Lafayette, Ind., which is possibly one of the largest in Indiana, having a capacity of 70 cars per day, is working at only about half capacity. They have several big orders but they are only for several cars per day. As soon as the Big Four railroad becomes more active they look for a big increase in business.

Austin, Texas—An unusually large number of samples of materials for highway construction have been tested by the Bureau of Economic Geology of the University of Texas during the last few months. As a result of the unprecedented activity in road construction the development of rock quarries and gravel beds in various parts of the state is being extensively carried on.

The Independent Sand and Gravel Co., at Des Moines, Ia., will be ready for operation August 1. The plant the company has installed is entirely modern and includes a 10-inch Ansco Manganese pump and locomotive crane. The firm will deal in washed sand and gravel. The officers are S. H. Larson, president; P. J. Quiverson, vice president; A. J. Bjorgo, secretary; and E. A. Lansrud, manager.

W. A. Gay has become owner of the Sam McAdam cement block plant. He is arranging to deal in gravel, cement, brick and tile, according to the Reynolds Press, Illinois.

The Coon River Sand Co., at Des Moines, Ia., have found it necessary to increase the price of sand and gravel 10 per cent when hauled by wagons. This is due to the increase in wages paid to teamsters.

The Carmichael Gravel Co., at Williamsport, Ind., is planning to completely electrify their plant. The three big transformers that are to be used in reducing the voltage to a suitable operating power are now at the plant, and as soon as the present work will permit the big improvement will be started. At present the plant is running very near full capacity and has orders to keep it going for some time.

The Western Indiana Sand and Gravel Co. at Terre Haute, Indiana, does not seem to be affected by the rather general shortage on gravel demand. The plant is at present operating on two 10-hour shifts and does not seem to be able to produce gravel fast enough at that. In all probability the plant will soon be operating on three 8-hour shifts. The Big Four is one of the Western Indiana Sand and Gravel Co.'s big customers.

Producers in northwestern Illinois met in Galesburg on July 24 under the auspices of Ben Stone, of the Illinois Sand and Gravel Producers' Association. Reports of various ones show the demand so far about 50 per cent of an ordinary year; there has been no municipal work of volume and very little road work let in this part of the state. An increased demand from the country trade is the principal hope for more business during the latter part of the season.

The Wabash Sand and Gravel Co. at Terre Haute, Ind., has been having considerable trouble with their big locomotive crane. And now at the best part of the operating season it has had to leave the pit for repairs. During this time the plant is being operated at reduced capacity by the use of a tractor crane. All speed is being made and it is hoped that the big crane will soon be on the job. Another year and this company will have all the gravel above water level removed. A suitable plant for removing the gravel below the water line is being considered. It will either be a drag line plant or a floating dredge.

Manufacturers

The Sullivan Machinery Co., Chicago, Ill., are circulating a condensed, well illustrated booklet (No. 118) on hammer drills and rock drills. Drills for all purposes are herein illustrated and described.

The Novo Engine Co. gives in Bulletin No. 18 a very thorough and reliable description of their gasoline engines; ranging in power from 1½ to 15 horsepower. Each part is taken up in detail.

Bulletin No. 819, or "Instruction Book and Repair List" is invaluable to the owner of a Novo Engine since it serves as a handbook for operation and repair as well as an order book.

The Smith Engineering Works, Milwaukee, Wis., manufacturers of rock, ore and gravel handling machinery, are circulating bulletin No. 264. This is a very complete and interesting as well as an instructive presentation of the Tel-smith Jaw Crushers, with both the stationary and mounted rigs. Operating views, assembled and sectional views are given and each is well described. The latter part of the bulletin is devoted to portable bins and crusher plants.

The American Cement Machine Co., Keokuk, Iowa, is circulating catalog No. 18, H20 and P20.

Catalog No. 18 is a well presented treatise touching both upon the mechanical and theoretical structure of Boss mixers. The catalog is very complete as to illustrations, description and explanation. It contains several very interesting and instructive tables of comparisons of Boss mixers, as well as mechanical drawings. The latter part of the catalog is devoted to hoisting machinery.

Catalog H20 is devoted entirely to hoisting machinery and elevators of various sizes and for numerous uses; driven by either gas, kerosene or electricity.

Catalog P20 features mixers with special loading devices, automatic power chargers and measuring batch hoppers.